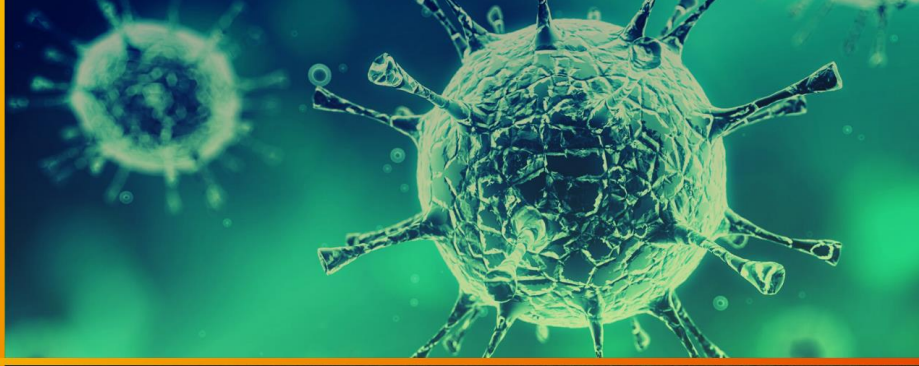

Pandemic Economy

Covid-19 effects and consequences in the first year

Charis ***Vlados***
Bachar ***Fakhry***
Editors

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Pandemic Economy: Covid-19 effects and consequences in the first year

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Preface

A repositioning of the theoretical instruments of development and growth in the context of economics and political economy that we have at our disposal to date seems necessary, especially after the structural transformation caused by the COVID-19 socio-economic and pandemic crisis. Specifically, the overcoming of the COVID-19 era of crisis seems to depend on how we will manage to re-perceive the theory of economic development and apply its proposals in new economic policies, in global terms. In this context, this article examines whether the conceptual and "therapeutic" foundations of development economics have today the necessary potential to cope with structural changes caused by the ongoing global socio-economic crisis. We assess the current debate in the literature of "economic development versus economic growth" and conclude that a new, comprehensive and evolutionary, orientation to understanding economic development seems necessary to respond to new global challenges for the post-COVID-19 era. We propose a multidisciplinary and evolutionary conceptual direction that suggests the multi-angle understanding of diverse historical

configurations. We argue that all socio-economic mutations accelerated by the current pandemic crisis have systemic and evolutionary content and effects and cannot be reliably perceived as mere coincidences of "quantities" and growth "performances." In this way, we can only disagree with any static and linear approach to the current crisis that directly or indirectly leads to reproducing the rigid enclosure of the analysis in partial specializations of economics. On the contrary, we counter-propose a theoretical response of evolutionary type to assess the contemporary theory of economic development and the political economy in the post-COVID-19 era as an interdisciplinary crossroads for all socio-economic sciences.

The Covid-19 pandemic raised a few issues concerning how market participants react to a global pandemic. The pandemic was a black swan event on some levels; there had been few pandemics that have had such a global impact: the Spanish Flu of the late 1910s and 1957 influenza. Moreover, global interconnection means that the Covid-19 pandemic was able to spread across the globe quickly, thus indicating that extreme measures were needed to bring it under control. The policies taken by governments around the world had a significant adverse impact on the economy. It is with these factors in mind that we research the psychology of the market participants during the pandemic. Conversely, we introduce a new model of behaviour during uncertainty, which explains how market participants react during crises such as the Covid-19 pandemic. The model analyses the psychological issues, both emotional and cognitive, influencing the pandemic. We found that like any other crises, market participant reacted to government actions and announcements and the impact on the economy. Therefore, leading to the old issue of miscommunication and insufficient actions.

The New Zealand economy is in a parlous state and not simply because of the economic fall-out associated with the pandemic. For decades now, New Zealand has been falling further and further behind its OECD partners, with institutional inefficiencies, poor policy making and the almost willful refusal of successive governments to admit to (let alone confront) mounting economic problems, all combining to place us on the edge of a deep, and lasting, economic downturn. Across a broad plethora of areas and key economic indicators, New Zealand lags behind almost every other advanced country against which it has traditionally measured itself. These areas include the three pillars of social wellbeing (education, health, and social welfare), housing, tax, productivity and debt. In every case, we are either falling behind outcomes achieved in other countries (education, health, productivity), entrenching inequality through our failure to cater for the needs of our most vulnerable (housing, health, education, social welfare, tax), or failing to prepare adequately for looming economic and social costs - including those incurred by a rapidly aging population. If ignored, these problems will precipitate a crisis that may make the burden of recovering from Covid-19 pale by comparison (superannuation, health, debt). In its much anticipated post-Covid budget, the Labour Government needs to not only provide a clear blueprint for helping those who have been adversely affected by the pandemic and New Zealand's subsequent lockdown, but also signal its intention to tackle the systemic weaknesses which have placed our economy at such risk, and which threaten to consign our future generations to unwelcome, and unnecessary, economic and social hardship.

In economics, the problematics of development and underdevelopment is a field of conceptual controversies and constant "re-comprehension," already since classical economists' fundamental explorations. Nowadays,

especially within the particularly pressing conditions caused by the global pandemic of COVID-19, it seems that this field of research and scientific knowledge must be profoundly re-fertilized in analytical and explanatory terms. The current crisis seems to function as a catalyst for various structural changes globally, leading to a necessary theoretical reorientation of the related thematics towards exploring the inner evolutionary "mechanisms" that will drive socio-economic development (and underdevelopment) in the future. This article aims to study the conceptual evolution of the notions of development and underdevelopment in the light of modern evolutionary economics, which we think could offer a foundational repositioning at the interpretative level in response to the new emerging conditions. More specifically, this article tries to respond to what development and underdevelopment mean over time, where analytical readjustments the evolutionary economics lead to nowadays, and whether it is possible to counter-propose a multilevel approach that enriches the theoretical background for an interdisciplinary and unifying understanding of the specific problematics at the dawn of the new global reality that appears in the post-COVID-19 era. At first, we look at essential development and underdevelopment concepts by critically exploring corresponding basic definitions throughout time. Next, we study the essential and associated elements of evolutionary economics, in the light of the problematics of development and underdevelopment of our days, intending to reach a synthesizing theoretical perspective. We counter-propose the "development web" approach and analysis as a useful repositioned perspective on addressing the developmental/underdevelopmental problem since the compartmentalization of social sciences between the "micro, meso and macro" approaches seems progressively inadequate and sterile.

The COVID-19 pandemic gave minimal reaction time to governments around the world. While causing millions of deaths, it was also detrimental to the global economy. This paper is an attempt to understand what we can learn from our experience with the virus, with a focus on the United States. I discuss good and bad U.S. policies and the overall performance of institutions involved in pandemic response. The approach is economical because it connects what happened with some key economic principles. I talk about how markets helped us generate most of the knowledge we have on the virus, and I explain how existing regulations slowed down the production and distribution of essential items in the fight against Covid. Given the scarce nature of public attention, I also discuss the lack of consistent public messaging for the pandemic in the United States.

Dr. C. Vlados
Dr. B. Fakhry
30 September 2021

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1 The growth and development analytical controversies in economic science: A reassessment for the post-Covid-19 era

Charis VLADOS [†]

Introduction

The current COVID-19 pandemic seems to be changing our world drastically. COVID-19, in addition to its devastating health consequences in the first phase, is now known as an ongoing economic crisis that speeds up the transition to the next step of globalization and the fourth industrial revolution (Altman, 2020; Bonilla-Molina, 2020; Steiner & Gurría, 2020; Vlados, Deniozos, & Chatzinikolaou, 2018a). It rearranges all aspects of our socio-economic and political existence profoundly. In effect, the COVID-19 pandemic, even though it rose as an exogenous health shock to the global community, paves the way for significant

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structural socio-economic mutations that are endogenously produced and reproduced. It contributes to global social turmoil and instability, international recessionary strains, decreasing global wages, and the rise of poverty and unemployment in industries that were efficient until recently (Air Transport Bureau, 2020; Heinonen & Strandvik, 2020; ILO, 2020; OECD, 2020; United Nations, 2020). In this context, reorganizing and enriching the theoretical instruments at our disposal seems essential to perceive, forecast and confront these changes more thoroughly. Even more profoundly, the current pandemic crisis seems to be repositioning the expectations and demands we have from modern economics. Nowadays, approaches that challenge the interpretive validity and predictive credibility of economic science itself do not cease to appear (on "whether economics is a science," the following are indicative: Appelt, 2016; Davidson, 2012; Eichner, 1983; Hicks, 1984). To what extent is it justifiable to question the scientific character of economics? Nowadays, we think that economic science has relative conceptual, interpretative, and "therapeutic" potential to cope with this unprecedented crisis and ease its effects.

The primary question posed by scholars and policymakers now is what shape the global economy's recovery and recession will take in the future. We present the main points they make about the global recession's shape, distinguishing them between V, U, Nike swoosh, W, and L. A "V-shaped" recovery, which signifies a rebound of economic activity after a steep decline, although appeared to have many supporters as a direct perspective on developments in the global economy in the recent past, it now seems sufficiently over-optimistic. A "U-shaped" recovery, which predicts a sharp dip, followed by an extended return to a pre-COVID trajectory, also seems quite uncertain as the second wave of the pandemic nowadays

sweeps the planet. The "Nike swoosh-shaped" recovery, named after the famous brand logo, seems to be closer to the future reality, provided that the diffusion of the vaccine is sufficiently rapid and widespread, having prevented the permanent destruction of several businesses, industries and production structures on a global scale. A "W-shaped" recovery also remains quite likely for several regions of the planet as it signifies a possible "double-dip recession" caused by difficulty spreading a treatment or vaccine for the virus, which would shield everyone's health. Finally, an "L-shaped recession" seems unfortunately quite possible, in our view, for many less developed ecosystems on the planet that do not have sufficient resilience, adaptability and innovation to benefit from the future return of international markets to a positive sign (Beech, 2020; Gómez-Pineda, 2020; Gregory *et al.*, 2020).

However, in most cases, this economic debate does not seem to go beyond the threshold of mere quantitative forecasting and linear understanding of the effects of the COVID-19 pandemic. It continues to be carried out mostly in terms of simple mapping and superficial investigation of the effects of the crisis on the individual negative growth indicators and the more specific contraction rates of the markets and economies of the international economy, rarely exposing the necessary in our view more profound structural effects that the current crisis incubates (Chodorow-Reich & Coglianese, 2020; Gallant *et al.*, 2020). Furthermore, it is a crisis that cannot be validly perceived as a mere cyclical fluctuation in the world economy, but rather it is the cradle of a new page in the evolution of the global economy. This crisis signifies the emergence of a "new globalization" which brings a host of new challenges—threats but also opportunities—for all the socio-economic systems—more or less developed—and for all actors—of greater or lesser power—on a global scale (Ahmad, 2013;

Bhattacharya *et al.*, 2017; Bremmer, 2014; Laudicina & Peterson, 2016; Namaki, 2017; Vlados, Deniozos, & Chatzinikolaou, 2018b, 2018c; Vlados, 2019c).

Quite naturally, this observed relative "quantitative myopia" of the majority of current approaches to the crisis caused by the COVID-19 pandemic does not seem unexplainable to us. This "analytical restriction" is primarily due to the "perpetuation" of the growth perspective's dominance over the more comprehensive, substantial, and complex developmental perspective in analytical terms. In practice, this is yet another proof of the continuing existence and reproduction of the interpretive polarization between two central traditions in the context of economic science: the school of thought of economic growth versus the respective school of thought of economic development (Chiras, 1995). In this article, we argue that this analytical dipole (growth versus development) must now be thoroughly reviewed in the context of today's economic science[2] and open new paths towards a comprehensive and evolutionary understanding of the contemporary socio-economic reality that begins to emerge through the current crisis.

Given these subversive circumstances of our days, this article precisely aims to answer the following questions critically:

[2] The reason we use the term "economic science" is aptly explained by Rothschild (1989, p. 12): "*But after having tried to draw a line between 'political economy' and 'economics' I want to stress that, of course, both are part of the wider system 'economic science' and that the frontiers between the sub-systems are fluid. This is even more true for persons who cannot be exactly divided along these lines. What is ultimately needed is good economic theory and good economists and the hope that out of the cooperation and confrontation of various attempts and approaches new and fuller insights into the socio-economic process can be gained. If a special plea for a wider use and recognition of political economy is in place to-day, it is because of the hegemonic role which neoclassical and general equilibrium economics has obtained in recent decades.*"

A. What really is economic science, and what can we expect from it in the future? What are the primary ingredients of successful scientific research in economics? From a more generic perspective, can economics be "sterilized" by its ideological and political elements while keeping its vitality and usefulness? What are the main problems and challenges for modern economics in the era of the COVID-19 crisis?

B. How is the economic development delineated, and what new dimensions does it seem to take nowadays? How is the theoretical dipole between economic growth and development defined, and how does it evolve conceptually?

C. How could we understand from an evolutionary perspective the problematics of economic development in the post-COVID-19 era?

We will try to answer these questions by performing a semi-systematic analysis and critical evaluation of the available literature (Snyder, 2019). We specifically use the semi-systematic approach to create a broad timeframe that will clarify conceptually how the specific field of the "conflict" between the development and growth perspective has progressed over time and developed across different theoretical contributions and traditions.

What does economic science mean nowadays?

Science does not just mean knowing something well enough. Nor does this knowledge derives solely from the etymological interpretation of "episteme," which means in Ancient Greek to know, understand, and be in general acquainted with (Liddell & Scott, 2009). In the definition of today's sciences, the most significant aspect lies in how they manage to know something well enough. In other words, here lies the determination of the method that can be described as scientific (Losee, 1972). F. Bacon, in the early 17th century, claimed that the purpose of science is to

improve the fate of man on earth by collecting facts from systematic observation and extracting theories from them. In Galileo's convergent view, the main thing is to accept the facts and build a theory that harmonizes them (Psillos & Curd, 2010).

Young (1927) argues that specific interpretative conditions in all social sciences exist, which, just like in natural sciences, explain the complex evolution of events. These events can give the impression that they are arbitrary or strange. Therefore, they can be integrated into a system that has available space only for reliable uniformity and regularity, and this is every scientist's first article of faith. The second article of this faith is that this hidden uniformity can only be known to us after methodical and patient research (Young, 1927).

More recently, Gould & Kolb (1964) offered an additional definitional aspect of science, noting that the term defines the systematic, objective study of empirical phenomena and all the resulting knowledge. However, according to Gould & Kolb (1964), difficulties also arise in each of these adjectives (systematic, objective and empirical). Apart from the multiple and delicate conceptual questions raised by scientific methods, in all fields of today's scientific research, another significant aspect is the indivisibility between the spheres of theory and practice. The correct scientific approach of any kind can never be cut off from empirical elements since it always starts from empirical reality, synthesizes at the level of theory, predicts and controls the accuracy of its predictions by returning to empirical reality. The fundamental methodological circle of all empirical sciences can be described as follows (Figure 1).

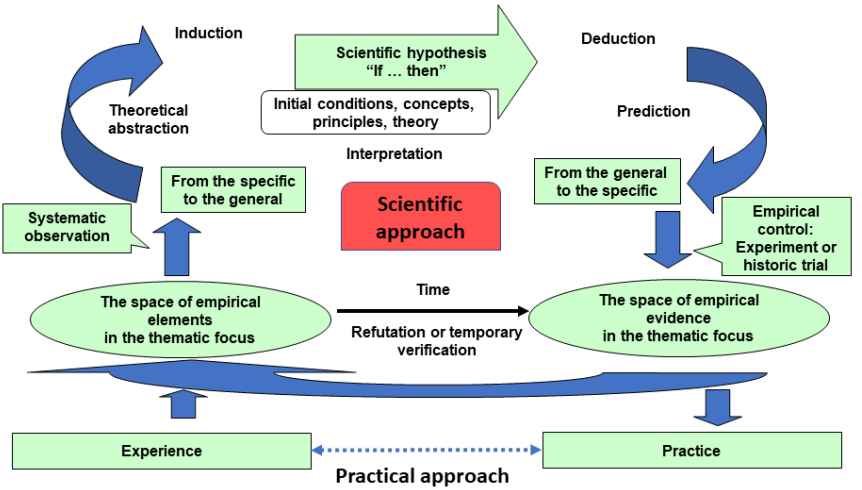

Figure 1. *The fundamental methodological circle of empirical sciences*

The practical approach to problems and questions arising from the actual world differs from their scientific approach. The scientific method always starts from experienced observations, which, in the next step, should be classified in the different thematic fields concerning them. The aim is to build a theoretical abstraction from the "specific" to the "general" (induction) and to structure a scientific "if-then" hypothesis, expressed in the derivative concepts, principles, theories. In the deduction step, the successful methodological circle proceeds to predictions, as it returns from the "general" to the "specific." At this point, the researcher must accept and conduct empirical control of both the interpretation and predictions. Finally, the scientific theory is validated or not by reality and according to the elapsed time, after used in practical application and until a new methodological synthesis arises, capable of "rejecting" validly the previously established theory. Therefore, in principle, every science follows an interaction between theory and experience-practice. In this attempt to articulate the scientific "logics," distinct conceptual spaces exist:

- The "initial conditions" are groups of decisions that determine the context and details in which the investigation occurs.
- The "concepts" make up the intellectual perspectives of any subject, formed by a generalization of facts and related information.
- The "principles," which the scientist expresses at a specific point in time, are fundamental truths or forms that explain the relationships between two or more classes of variables, and usually between an independent and dependent variable. They may be descriptive and explain what is going to happen, or determinant and show what the individual should do, in which case they involve judgment based on a specific scale of values.
- The "theory" appears as a systematic classification of interconnected principles and concepts, offering a framework for the systematization of knowledge.

Therefore, the confusion between scientific theory and the analytical axiom is wrong. A. Einstein (1988, pp.322, 355) suggests that an integrated scientific perspective and an "axiomatic" theorem are different. A. Einstein argues, referring to his field of research:

> "Physics constitutes a logical system of thought which is in a state of evolution, whose basis cannot be distilled, as it were, from experience by an inductive method, but can only be arrived at by free invention. The justification (truth content) of the system rests in the verification of the derived propositions by sense experiences […] The skeptic will say: 'It may well be true that this system of equations is reasonable from a logical standpoint. But this does not prove that it corresponds to nature.' You are right. Dear skeptic."

In any direction of investigating how the scientific approach is functionally articulated, we also must deal with significant methodological issues. Such issues are the following:

- How significant are the initial conditions, which define the thematic focus in which the research is conducted (Mill, 1843)?
- Is the vital role of theory accepted before observation (Russell, 1962)?
- How dependent is the observation on the researcher's pre-existing experiences, knowledge, evaluations and expectations (Popper, 1963)?
- Was refutability recognized as part of the valid scientific hypothesis (Popper, 1934)?
- How are the revolutionary elements involved in scientific progress and the emergence of new paradigms (Kuhn, 1962)?
- How to understand that all scientific methods have their limitations (Feyerabend, 1975)?

A. Young (1927, pp.14, 23) states that in order for scientific research to be successful, the primary criterion is the following:

> "In any case, the prerequisites to really successful research are significant questions and fruitful hypotheses. Successful research, of course, calls for industry and a command of the appropriate technical methods. But if it is to be anything more than mere fact-finding, it calls also for imagination, for the ability to see a problem and to devise hypotheses that are worth testing. Industry fortunately is not an uncommon virtue. Technique may be acquired. But imagination, and especially the kind of imagination that keeps its moorings, is rare. […] The important things are that the investigator concern himself with a real problem; that some goal be seen, however dimly, towards which his inquiries should converge; that he be openminded enough to permit new evidence to lead him in a new direction; that he remember that successful economic research calls for thinking as well as for routine processes."

In this methodological context, what could be an adequate and inclusive definition for contemporary economic science? From an introductory perspective, economic science is the systematic study of how people and their social formulations choose, in historical terms, between alternative uses of their scarce resources to meet their needs as fully as possible. From Samuelson's perspective (Samuelson, 1997), economic science is the study of how people and their societies choose, with or without using money, to employ the productive means that have alternative uses to produce various goods and to distribute them between the different individual and social groups that consume them, now or in the future, by analyzing the costs and benefits resulting from improving these means of production. A. Marshall (1890) also gives a very comprehensive definition of economic science. Economics studies humanity in the conduct of its daily life, and, in this direction, the role of such science is to group and analyze economic phenomena and use the knowledge learned from observation and experience. Such a comprehensive approach to the problems of economics leaves no dimension of our social life unexamined. Also, considering the classic statement of T. Carlyle that economics is a "dismal science," we affirm that economics cannot, by its very nature, be a "romantic" occupation. Economics deals with lack of resources, poverty and deprivation, hunting down "naivety" and all allegedly "untroubled" ways to fight against humanity's constant and intense problems.

What do we look for as a scientific community and a broader society from modern economic research and science? As A. Young (1927, p.25) states, as early as the third decade of the last century:

> "Some eighteenth-century philosophers professed to believe that all the imperfections of human society might be got rid of, if only men would put their trust

> in reason. The same faith is held today, but the word 'reason' has been replaced by the word 'research.' One does not have to subscribe to this creed—and I cannot subscribe to it—in order to believe that the increase in the number of able men who are bringing the spirit of scientific inquiry into the study of economic problems gives us ground for hoping that we shall learn how to deal with those problems more effectively and more wisely. I say 'more wisely' as well as more effectively, because I believe that social wisdom as well as a better knowledge of ways and means ought to be one of the goals of research in the social sciences."

Moreover, economic science is manifold and fruitfully heterogeneous from its very roots. There are various historical and geographical specificities within economic science and methodological variations, value judgments, ethical orientations, and ideological and political parameters. By extension, economic science hosts and develops a multiplicity of interpretive paradigms. As T. Kuhn (1962, pp.viii, 4) puts it:

> "These I take to be universally recognized scientific achievements that for a time provide model problems and solutions to a community of practitioners […] What differentiated these various schools was not one or another failure of method—they were all 'scientific'—but what we shall come to call their incommensurable ways of seeing the world and of practicing science in it."

Within economic science, metaphysical suggestions are also necessarily involved, and the "problem" of value judgment is addressed. Is this a real problem? According to P. Streeten's view (1950, p.595):

> "Even if it were possible for economists to refrain from value judgments, this would not be desirable. 'The borderlands of economics are the happy hunting-ground of the charlatan and the quack,' writes

> Professor Robbins. Moral philosophers do not tell us what our economic system ought to be like; perhaps because their problem is what ought to be in general. It is up to the economist to evict from the happy hunting-ground the charlatan and the quack. But, granted that value judgments are necessary and desirable, the economist should make them explicit. Thus disputes about facts and logic may be separated from disputes about ends and duties. This separation may not always be easy or possible. But honesty demands that we do it as best we can."

Modern economics cannot and should not be entrenched in a monolithic and unanimous paradigm. As Guillaume (1986) reminds us, science is not the monopoly of a theory but the product of competition between theories within verification conditions imposed on a scientific community. Besides, economic science could not be "sterilized" by both political and ideological orientations and components because, in this direction, it would lead to conceptual ossification and methodological mutilation. According to J. Robinson (1955), it is foolish to reject a piece of analysis on the pretext that we disagree with the economists' political judgments. According to Robinson, an economic theory is, at best, only a hypothesis, and if the facts do not allow it to be justified, then it must be rejected. Robinson aptly concludes that to make fair use of an economic theory, we must first remove the elements of propaganda from its scientific evidence, contrast the latter with experience, see to what extent the scientific evidence appears convincing and finally re-combine it with our personal political views.

If we could separate the "technical part" of economics from the inherent ethical and ideological orientation of politics, would this be in economics' interests in descriptive, predictive and interventional terms? To this question, Galbraith's response (Galbraith, 1987) is quite comprehensive, arguing that the separation of economics

from politics and political motives is always something sterile, which also acts as a cover for the reality of economic power and impulse. This fact is also a significant source of misjudgment and error in economic policy. As Galbraith (1987, p.299) concludes, "*No volume on the history of economics can conclude without the hope that the subject will be reunited with politics to form again the larger discipline of political economy*." Equally comprehensive is Galbraith's response (Galbraith, 1987) on why economists often do not agree with each other, arguing that the most significant reason—and the "most forgivable"—is the problem caused by change. The hypotheses of physics, chemistry, or geology are static, while economics is subject to constant change. Therefore, if economics does not want to fall into a disrepute regime, it must adapt to these transformations by assimilating the latest information and revising its interpretations. Economics must evolve to the extent that the institutions "of the base" are also evolving. Galbraith (1987) argues that a discrepancy settles between economists who react differently to these changes. Some economists are "hinged" at the illusion that the subject of economics remains unchanged, just like other sciences. Other economists accept the obvious fact that what was true yesterday in terms of businesses, trade unions, consumer and government, and economic life structures is no longer true today and will be even less tomorrow.

Therefore, are there specific problems in economic science? Is economic science capable of dealing with tremendous future challenges, especially in the post-COVID-19 era? These concerns are not new to economic reasoning and questions posed. As early as the 1970s, N. Kaldor (1972, p.1240) has sufficiently addressed this concern with the following statement:

> "There is, I am sure, a vague sense of dissatisfaction, open or suppressed, with the current state of economics among most members of the economics

> profession—as is evidenced, for example, by recent Presidential addresses to the Royal Economic Society and to section F of the British Association. On the one hand it is increasingly recognised that abstract mathematical models lead nowhere. On the other hand it is also recognised that 'econometrics' leads nowhere—the careful accumulation and sifting of statistics and the development of refined methods of statistical inference cannot make up for the lack of any basic understanding of how the actual economy works. Each year new fashions sweep the 'politico-economic complex' only to disappear again with equal suddenness […] These sudden bursts of fashion are a sure sign of the 'pre-scientific' stage, where any crazy idea can get a hearing simply because nothing is known with sufficient confidence to rule it out."

Is it possible that economic science, as critics argue, can be perceived as merely a modern form of "astrology" (Allum, 2011)? Apart from being unfair, these "aphorisms" are also entirely unsubstantiated. Without the progress of economic science over the last two and a half centuries, where it has a scientific character, our world would be vastly different and much more violently bound to the age-old poverty and scarcity than it is today. Keynes (1936, p.383) addresses this concern eloquently:

> "[…] the ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. [...] Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist."

In the background, the purpose of economic theory is to embrace as comprehensively as possible the economic act itself (the praxis). Experience can only be the source, the cradle of any theoretical proposal and, simultaneously, the necessary field of control and testing. The practice is both the

necessary starting point and the conclusion of scientific inquiry. In this context, the economic theory must follow at least three principles:

- Always start from the systematic study of empirical reality, building through theoretical abstraction precise and explicit concepts and general formulas for the phenomena.
- Always compose the produced conceptual potential at the theory level, proposing coherent and complete interpretations of real facts.
- Always predict and evaluate the accuracy of predictions by returning to empirical reality. In other words, to evaluate without ever being caught in any definitive certainty and to not "deify" any finding. Science should leave available space for refutation in light of the latest information.

These principles presuppose a constant denial of the division between economic theory and empirical reality (Andrikopoulos & Nastopoulos, 2015). According to Gillis *et al.* (1996), economics' ultimate purpose is to develop theories whose validity can be tested with the available data. Therefore, the empirical or evidence-based approach and the theoretical approach are not two separate ways of looking at a given problem, but two parts of a single method. Increasingly, these two approaches are combined in practice.

There is no doubt, then, that man and society's study will remain a challenging and complicated task in the future. As one of the fathers of economic science, J.S. Mill (1974, pp.912–913), points out:

> "The fundamental problem, therefore, of 'the social science,' is to find the laws according to which any state of society produces the state which succeeds it and takes its place. This opens the great and vexed question of the progressiveness of man and society; an idea involved in every just conception of social phenomena as the subject of a science. [The progressiveness of man and society is not] peculiar to

> the sciences of human nature and society, but belonging them in peculiar degree, to be conversant with a subject-matter whose properties are changeable. I do not mean changeable from day to day, but from age to age; so that not only the qualities of individuals vary, but those of the majority are not the same in one age as in another."

Young's (1927) approach is once again nodal to conclude on the meaning of economics as a social science when he argues that every such science must be defined based on its specific problems. In this way, the conditions of any field of analysis must include factors, instruments and objectives, as well as a mechanism for organizing research activities. Even though every social science has a unique orientation, there are two things that we have the right not to tolerate—first, dogmatic misinterpretations of facts or conclusions, and second, the very lack of tolerance. All the previous clarifications create the necessary background to understand that the confrontation between development and growth thematics is neither superficial nor secondary to economic science's evolution nowadays, as we will examine in the next section.

Economics of development and economics of growth

In scholarly literature, research into the root causes of economic growth and development can be traced back to the works of J. Schumpeter (1942) and N. Georgescu-Roegen (1971), although seeds of this distinction also exist in the works of A. Smith (1776), J.S. Mill (1848) and K. Marx (1867). In these works, evolution and economic development are more profound than the mere accumulation of quantities (Alcouffe & Ferrari, 2008). Also, in these central perspectives, it seems that a dialectical way of understanding socio-economic dynamics is activated (Engels, 1873; Hegel, 1812;

Pederson, 2015; Sartre, 1960; Vlados *et al.*, 2019; Williams, 1989). To what extent has the scientific debate on the theoretical dipole between economic development and economic growth been structured, developed and matured to this day?

3.1. An attempt to delineate the theme of economic development

Economic development theory appears to study "specificities" in the evolution of different (and mostly less developed) socio-economic systems. As Hirschman notes (Hirschman, 2013, pp.50–51):

> "Development economics is a comparatively young area of inquiry. It was born just about a generation ago, as a subdiscipline of economics, with a number of other social sciences looking on both skeptically and jealously from a distance. […] traditional economic analysis, which has concentrated on the industrial countries, must therefore be recast in significant respects when dealing with underdeveloped countries."

Since the foundation of development economics in the post-WWI period, this scientific inquiry's identity became clear. According to F. Perroux's contribution (Perroux, 1969), economic development corresponds to the combination of a population's moral and social changes, enabling them to increase their actual total product in duration and cumulatively. In a similar vein, D. Hunt (1989) notices two decades later that economic development is the area of study that is simultaneously interested in interpreting resource allocation processes and economic change in the least developed countries, producing recommendations for development-oriented actions, including the choice of development strategy and the policies with which it will be pursued.

In this conceptual context, various traditional focal points in articulating economic development strategies were highlighted and structured. With a concise and accurate wording, A. Sen (1983, p.746) notices the following:

> "While there have been differences in assertion and emphasis within the mainstream of the subdiscipline, it is fair to say that in terms of policy the following have been among the major strategic themes pursued ever since the beginning of the subject: (I) industrialisation, (2) rapid capital accumulation, (3) mobilisation of underemployed manpower, and (4) planning and an economically active state. There are, of course, many other common themes, e.g. emphasis on skill formation, but they have not typically been as much subjected to criticism as these other themes."

The content of defining economic development never was—nor will ever be—something static and unanimously accepted. According to Vaitsos (1987), to contain development within a single definition is a restrictive task. Supplying a unique definition more excludes than identifies the components that characterize the evolution of society. Vaitsos (1987) notices that this happens because the content of development is multidimensional and dependent on the system of values and preferences that society sets for its development. The concept is not neutral, nor does it express abstract meanings that can quickly and uniquely be illustrated by simple and "objective indicators" of socio-economic activity. On the contrary, development is evaluative and stems from the specific social realities to which it refers.

Moreover, other approaches underline that real economic development can only exist when it leads to increased participation. As explained by Gillis *et al.* (1996, pp.8–9):

> "A key element in economic development is that the people of the country must be major participants in the process that brought about these changes in

> structure. Foreigners can be and inevitably are involved as well, but they cannot be the whole story. Participation in the process of development implies participation in the enjoyment of the benefits of development as well as the production of those benefits. If growth only benefits a tiny, wealthy minority, whether domestic or foreign, it is not development."

3.2. The critical question posed by the theme of economic development

As Stiglitz (1989) argues, a key question of development economics is how to explain income differences and economic growth rates between developed and least developed economies. In the 1950s and 1960s, the primary response was "the poor people are like the rich, except that they are poor." This diagnosis would lead to a recipe for increasing the resources in the least developed economies, primarily in human and natural capital, either by transferring capital to them (through direct aid or education) or by encouraging savings.

Today, these answers do not seem to convince policymakers and scholars, and, therefore, similar justifiable doubts are raised (see, for example, the discussion on the so-called sustainable development goals; Moore, 2015). According to Stiglitz (1989), if the problem were mainly the lack of natural capital, the return on capital would be much higher in the least developed countries, and the propensity of capitalists to profit would cause capital to flow from the most developed to the least developed economies. How can the high unemployment rates between the educated people, and the migration of educated people from the least developed to the most developed economies, be explained? Furthermore, the standard neoclassical growth theory forecasts for convergence of the per capita income growth,

interpreted as deviations in the savings rates, are not confirmed (Stiglitz, 1989).

Stiglitz (1989) notices that understanding this "paradox" requires observing other significant differences in the least developed countries, a view supported by studies that have examined similar factories' productivity in developed and least developed economies alike. As Stiglitz (1989) argues, this difference can be shown with a tautological sequence that considers differences in the economic organization, the interaction between individuals (productive factors), and the institutions involved in these interactions. According to Stiglitz (1989), among the most significant of these institutions are the markets.

In this sense, according to Assidon (2002), the emergence of the narrowly defined economic development theme is linked to the decline of the colonial empires. Assidon (2002) claims that the idea of development serves the claims of political independence of nationalist movements, while it is also present within the economic order brought about by the Bretton Woods agreements. In this first approach, as the author argues, development economics are of interest to emerging economies because economic development defines a limit related to both means of geography and wealth. Assidon (2002) concludes that economic theories of development will have in the future a subject defined by geography, with growth being a central issue and, from this point of view, there is no economic development but always comparative economics.

However, according to our critical examination of the topic, today's theory of economic development cannot concern social phenomena separately; the poor and the rich (Reinert, 2019), the underdeveloped and the developed (Bauer, 2015), the "Third" and the "First World" (Lee, 2011), the "South" and the "North" (Antunes de Oliveira, 2020). The reason behind this "failed" distinction is that all such

divisions are artificial, historically fluid, and necessarily co-defined within today's global "game" of economic development (Vlados, 2019c).

3.3. The economics of growth and development economics

According to Krugman (1996), both economic growth and development appeared as separate research areas at the beginning of the post-WWII period. The economics of growth arose from the interest in maintaining full employment in modern capitalist economies. Development economics focused on accelerating the process of economic growth in less developed, traditional societies. The economics of growth had a clear macroeconomic orientation and belonged to those who had already dealt with economic theory. Development economics was more "micro-economically" oriented and was gaining knowledge from relevant research in anthropology, sociology, and political science, as well as from the "preceptive" observations of economists with practical experience in the management of the development process (Krugman, 1996, pp.1–29).

In this context, it is not a coincidence that the relationship between the two related areas of economic growth and development has been turbulent to date. According to Ruttan (1998), "growth economists" tend to think that development economics literature lacks precision and is loaded with irrelevant details of organization and behavior. "Development economists" often believe that the only message sent to them by the opposite side is to correctly determine interest rates (and other forms of prices) without emphasizing the most significant structural dimensions of the development process. After a "schism" that lasted more than two decades, there has been a renewed interest in economic growth theory (Ruttan, 1998).

Therefore, the concepts of economic development and growth are not the same. Growth means the sustained over the years of one or more indicators, which, for a nation-state, reflect a significant economic size or flow. The GDP (gross domestic product) is mostly used as the primary indicator, usually divided by the domestic population (average GDP per capita). On the contrary, the concept of economic development is inextricably linked to evolution, meaning irreversible changes in events and structures bound to each other instead of a succession of random elements (Perroux, 1981).

From our perspective, we are convinced that development economics must encompass and re-fertilize the economics of growth towards an evolutionary orientation. Although economic development is impossible in the long term without parallel economic growth, the two concepts must be distinguished analytically but can only be complementary in hermeneutic terms. Ultimately, it is clear that the "conventional" approach to economic growth only studies the accumulation of quantities, while economic development refers to profound, qualitative and structural, socio-economic transformations (Vlados, Deniozos, Chatzinikolaou, *et al.*, 2018). The latter's study seems increasingly necessary to conceive the concept of crisis and the necessary terms to exceed this phase in the context of today's economic science. Using a metaphor (Lakoff & Johnson, 1990; McCloskey, 1998), we could argue that economic growth studies the "physics" of the economic system, while development economics ought to focus on the system's "biology" and the "living organizations" it hosts (Vlados, 2019a).

From this perspective, standard neoclassical economics considers that critical development issues, such as distribution, poverty, technological change, political power, crisis, innovation and other socio-economic dimensions, are

"external" to the interpretive scope of "pure" economics (Nelson, 2018; Vlados, 2019b). In other words, they implicitly assume that development is ultimately an un-historic, uniform, and mechanistic process of quantitative accumulations, carried out within a static framework of unaltered social forms and political priorities (Chatzinikolaou & Vlados, 2019). These mechanistic approaches argue that the exclusive study of market flows—and not the study of the complex socio-economic structures based on these flows—is sufficient to capture society's economic progress. They also tend to think that economic development is merely a "matter of time" for an economy that grows since the wealth provided by economic growth will eventually spread to all areas of economic interest (Coad, 2010; Ghazinoory *et al.*, 2017; Nelson & Winter, 1974). In this context, various approaches unfold in scholarly literature over the past years that discuss the contradictions and the prospects of the economic development and economic growth theoretical dipole (Table 1).

Table 1. *Contributions in the dipole "economic development versus economic growth" over time*

Author	Main questions researched on the issue under analysis	Respective main ideas or conclusions proposed
Zuvekas (1980)	How can we define and measure economic growth and economic development, and what are the obstacles to achieve them? What are the limits to growth by also considering other social parameters and dimensions, such as the influence of population growth and government role?	Economists commonly use the term economic growth to refer to gains over time in the real production of a country's goods and services—or, more accurately, the actual output per capita. On the contrary, economic development is a more complex issue; economists have described it as growth followed by changes in the country's economic structure and social and political system.
Brown *et al.* (1992)	How can we design a dynamic and sustainable economic system that does not harm the natural environment and its underlying structures?	Gross National Product is an outdated indicator of success in a society that aims to address people's needs efficiently and with the least environmental impact. What matters is

	What are the primary instruments for reforms toward greater efficiency and equity, and what is the difference between conceptualizing qualities and quantities in economic analysis?	not production growth but the quality of services provided. With the end of the Cold War and the presumable fading of ideological barriers, there is a chance to build a new world upon the foundations of peace through a sustainable economy.
Brinkman (1995)	How can we conceive science within specific paradigmatic boundaries? Is a criticism on growth economists justified when their analyses perceive development as the independent variable upon which growth is dependent?	The quantitative statics of economic growth is considered synonymous with economic development frameworks and structures. Both growth (reproduction and replication) and development (mutation and transformation) are prerequisites of economic evolution. However, a leveling based on the logistic growth curve can be the only outcome of economic growth.
Chiras (1995)	What are the principles of sustainable development in ecological, social, economic, and political terms? In this context, what can be a form of a sustainable public policy?	In the 21st century, a new "paradigm" of sustainable development appears. Some economists seek "infinite" economic growth within a finite system, which is clearly unsustainable and potentially catastrophic. Economic growth policies that promote an "uninterrupted" economic expansion are unsustainable.
Papanek (2002)	Why is economic development different from growth? How can economic development be promoted and supported in Central-Eastern European countries?	Mainstream twentieth-century theories often do not differentiate between growth (rise in Gross Domestic Product) and development. For them, both concepts are synonymous. Economic development complements the quantitative perspective with the qualitative conditions for long-term success and sustained national enrichment.
Hosseini (2003)	What are the confusions in defining economic development and growth, and what are the consequences? Is "monoeconomics" a limiting approach to understanding economic development when considering the economic laws to be universal and apply everywhere?	The simplifying view of growth in the early days of development economics led to the confusion of development with the less complicated economic growth notion. This confusion was the main reason behind using GDP per capita as economic development's sole measure, using models such as the Harrod–Domar, which is inherently a growth model, not an economic development approach.

Alcouffe & Ferrari (2008)	What are the views of Georgescu-Roegen and Schumpeter on economic evolution and development beyond growth? Are their perspectives evolutionary and dialectical? What are their differences?	Schumpeter and Georgescu Roegen have endorsed the development approach. Georgescu-Roegen characterized evolution as the degradation of energy and matter (physical law of entropy). Schumpeter considered the occurrence of new combinations or the accumulation of capital (innovations) as the primary factors behind the economy's materialization (economic law of competition).
Wang *et al.* (2008)	Is there a difference between economic development and growth? What do development economics t417eories mean for human resource development?	Economic growth assumes that some variables stay unchanged from a comparatively static perspective (ceteris paribus hypothesis). In contrast, a dynamic development analysis deals with successive structural transformations through processes where multiple variables are in constant motion.
Peet & Hartwick (2015)	How have development theories unfolded throughout history? Are there differences between conventional and non-conventional development perspectives?	Economic development focuses on all aspects of economic and social activity, for example, simultaneously on the environment and labor relations. Economic transformation and development mean a change of the world for the better, being both "optimistic" and "utopian," starting from the bottom up and not the other way around.
Xu & Liu (2017)	Why has China a high growth rate and low development level? What theoretical and practical pitfalls exist in understanding and supporting social stability and development while achieving high growth?	People believe that all their social problems will be resolved by merely raising the GNP growth rate by an average of five percent. Despite the academic consensus that the term development has a broader connotation than growth, it is a great misfortune that nations still refer to the GNP growth rate as their primary or even sole national concern.
Marinelli (2018)	What does the term eco-civilization bring to the political discourse? Can global prosperity be achieved based on eco-civilization, and how this term differs from traditional economic growth	Eco-civilization means managing more comprehensively and rethinking the relationship between humans and nature. This concept allows us to move from the binary political discourses of "development versus growth" and "capitalism versus socialism" to a new

	and development theories?	understanding where prosperity is paramount in ecologically and socially sustainable terms.
Nnadozie & Jerome (2019)	How economic development and growth can be defined measured? What are the usual misconceptions conveyed in the analysis of the concepts? Is economic growth different from economic development and welfare?	Economic development and economic growth are two different concepts. Economic growth reflects the increase in national or per capita income and GDP. On the other hand, economic development refers to improving the quality of life, poverty reduction, and the fundamental changes in the economy's structure. Citizens must take part in the structural transformation processes that concern them and benefit from this change.

Finally, agreeing to a great extent to the previously presented approaches and conclusions in the "economic development versus economic growth" dipole, we also consider that the institutional dimensions to deal with this issue is of paramount importance nowadays (Vlados & Chatzinikolaou, 2020). As Acemoglu (2012, p.545) argues, "[while economic growth is] *one of the most relevant and exciting sub-areas of economics* [the] *problem of economic development remains a major one for humanity at large and for economics as a science*." Acemoglu *et al.* (2004) also propose an institutional framework that explains why some countries grow and develop faster than others, arguing that politics, the structure of political power, and the nature of political institutions are the basis for a valid theory of why different countries have different economic institutions and not the neoclassical growth model and its extensions.

Towards a multidisciplinary socio-economic and evolutionary understanding of crisis and development in the post-COVID-19 era

Is development economics a declining branch of economics? Is the theory of economic development a "not so useful" science that has exhausted the possibilities for further interpretive progress and sophistication (Cristaldo *et al.*, 2018; Easterly, 2002)? Our answer is categorically negative. Is growth economics also pointless and of reduced usefulness (Aidt & Dutta, 2007; Barro, 1997; Passet, 1979)? We would not agree to that either, to the extent that growth economics is still a source of useful information through its firm commitment to quantifying the effects of the crisis and growth.

However, the role of contemporary development economics seems to us to be much broader. Development economics is a challenging and complex area of today's economics, which seems crucial nowadays, in the face of the new post-COVID-19 era. However, we think that contemporary economic development must be conceptually expanded and enriched as a field of research. According to the methodological framework proposed by Gillis *et al.* (1996, pp.xiv-xv), for their textbook on development economics, there are at least five elements that the scholar of development must take into account:

> "The forces underlying economic change [the truly enduring aspects of development] may be barely perceptible, but they can be powerful and can radically alter a country's standard of living in two or three generations. To meet these challenges, Economics of Development continues to rely on five distinguishing features: (1) It makes extensive use of the theoretical tools of classical and neoclassical economics, in the belief that these tools contribute

> substantially to our understanding of development. (2) It draws heavily on decades of empirical studies by economists and economic historians, studies that have uncovered and explained the structure of development, or at least narrowed our zones of ignorance. (3) Economics of Development deals explicitly with the political and institutional framework in which economic development takes place. (4) It presents many real-country examples to illustrate major points, drawing on the authors' collective experience of—hard as it is for us to believe—more than a century of work on development issues. (5) The book recognizes the diversity of development experience reflected in these country examples and acknowledges that the lessons of theory and history can only be applied within certain institutional and national contexts."

Although these general guidelines of Gillis *et al.* (1996) continue to be valid as an orientation for modern development economics, we also think that additional "ambitions" should be formulated for the progress of development economics, especially in the light of recent global changes. The main methodological principles that seem to be of critical importance nowadays for the "physiological" transformation of development economics are the following:

- Understand the continuous contact and "communication" with the real (empirical) data provided by economic history.
- Realize the progressive assimilation of a systemic and evolutionary way of conceiving and analyzing the development phenomenon.
- Deny any rigid perspective that entrenches and "over-specializes" the different branches of economics.

- Claim an initiative-taking and interdisciplinary spirit that involves all research components of today's social sciences.

4.1. Focus on the indivisibly historical nature of development dynamics

The analysis of contemporary development dynamics must always start from the historical examination that focuses on the specific and structural socio-economic forms and situations. Otherwise, development economics can turn into a dogmatic—almost "prophetic"—exercise that necessarily results in "theoretical" naivety and interpretive disorientation. As there is no "end of development history" (Fukuyama, 1992) for any socio-economic formation, there is also no "definitive theoretical understanding" of development. Especially in the emerging post-COVID-19 era, we think that development economics must be prepared and quickly offer new "therapeutics" that derive from new and "paradoxical" phenomena and situations on a global scale which we will face in the near future. For example, we think that many less resilient and adaptive socio-economic systems on the planet at both spatial and sectoral levels will face idiosyncratic and relatively unprecedented difficulties in re-entering the global economic development trajectory after the end of the direct consequences of the pandemic (Nunn, 2009).

4.2. The efficient approach to economic development now requires an explicitly systemic and evolutionary way of thinking

The conventional linear and static way of thinking now seems to face a "dead end." Even today, many economic policy makers continue to use this way of thinking, considering that every economic problem has only one

"solution," that the "solution" does not affect the socio-economic organization altogether, and that once this "solution" is found, is continuously valid. On the contrary, the systemic and evolutionary way of development thinking, which is urgently required now, realizes that developmental problems are complex and inherently conflicting, created and reproduced as systems of problems that have more than one cause and accept more than one solution, affecting the entire evolving socio-economic organization. The process of selecting development solutions using systemic thinking involves assessing the impact of the solution on the "organic whole" and not only on the narrow area of the "economic problem." This thinking also considers that the problems and solutions do not remain constant, but they are always changing. Solving development problems, i.e., overcoming specific developmental obstacles, always appears as a dynamic and evolutionary process (Andersen, 2009; Boulding, 1981; Hodgson & Lamberg, 2018; Nelson & Winter, 1982).

4.3. Removal of entrenchment in unidimensional specializations of economics

The different dimensions by themselves are not sufficient for a fruitful approach to the complex phenomenon of economic development, fragmentarily and in the context of "autonomously" perceived scientific theorizations. Development economics requires a consistently synthetic interpretation attempt, approaching the problem's components in a dialectical way. In this respect, the economist of development must fully understand the "living evolution" of all socio-economic structures, which regularly change their different components and evolution patterns. The dynamics of development means qualitative transformations that occur step by step in every living socio-

economic actor and system (Costa, 2003; Robert & Yoguel, 2016; Saviotti & Pyka, 2004).

4.4. The theory of economic development should function as a research crossroads for all socio-economic disciplines

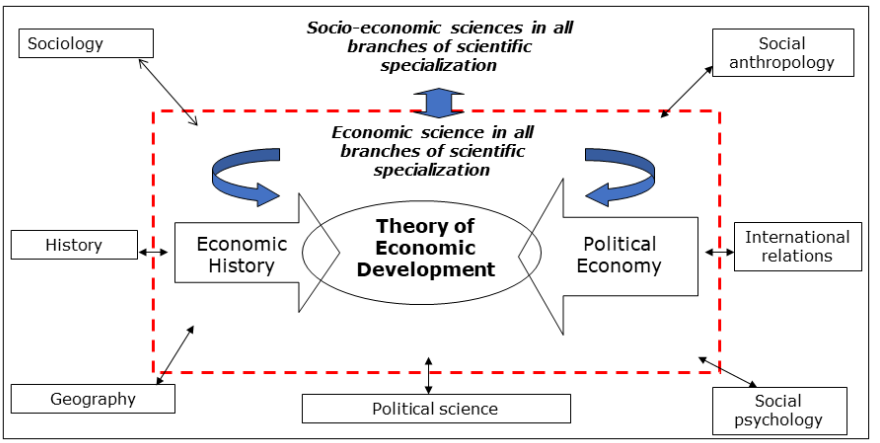

Figure 2. *Cross-fertilization between socio-economic scientific disciplines*

Nowadays, and for the post-COVID-19 era, it seems that the theory of economic development must function as a research crossroads for all socio-economic disciplines. In its interpretive and "projectional" dynamic, development economics should include and synthesize elements from social anthropology, international relations, social psychology, political science, geography, history and sociology (Figure 2).

All these aspects can and should be cross-fertilized in the context of today's economic science, creating the basis for continuous communication and mutual enrichment between the scientific fields of economic history and the broader field of political economy (Fine, 2019; Gasper, 2001; Neves & Neves, 2017; Siegers, 1992).

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2 The Covid-19 pandemic uncertainty behavioural factor model

Bachar FAKHRY [†]

Introduction

Influenced by the seminal work of Tversky and Kahneman (Tversky & Kahneman, 1973), (Tversky & Kahneman, 1974) and (Kahneman & Tversky, 1979), the theory of behavioural economics dictates that it is homo sapiens and not homo economicus that make decisions about every aspect of economics as pointed by (Thaler, 2016). Thus meaning psychological and sentimental factors influence the decision-making process, which is made difficult by the uncertainty surrounding the decision. Moreover, the opposite scales of emotional behaviour, greed and fear, often play a critical role in the process. Additionally, the process is usually clouded by behavioural biases and heuristics. Conversely, the key to understanding the decision-making

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process during a period of uncertainty is thru the analysis of these behavioural factors.

Furthermore, several external factors and actors could play an influencing role in the decision-making process; these externalities change with the underlying context of the period or event. These externalities could include factors such as financial, political, economical, nature and health; however, the actors also play a critical role: governmental, financial and consumers. Thus, pointing to a requirement to research these externalities to gain a more accurate and full picture of the market trend during a period of uncertainty. The uncertainty behavioural factor model is derived as a top-level view of these externalities and behavioural factors influencing the market participants decisions during an uncertain period, an extreme example of which is the unprecedented Covid-19 pandemic.

On 31 December 2019, the Chinese authorities informed the World Health Organisation (there after known as WHO) of the emergence of a new viral disease in the city of Wuhan. According to (Sohrabi *et al.*, 2020), the virus had infected 27 people with links to the Hunan Seafood Whole sale Market, which trades in fish and live animals. As stated by (Sohrabi *et al.*, 2020), the Chinese Centre for Disease Control and Prevention and the WHO identified the new virus as a new increment of the Severe Acute Respiratory Syndrom Coronavirus; subsequently named COVID-19 by the WHO. On 30 January 2020, the WHO declared the Chinese COVID-19 outbreak as a Public Health Emergencyof International Concern; however, on 11 March 2020, Covid-19 was revised from epidemic to pandemic status[2]. The globalisation and highly infective nature of the COVID-19 pandemic from such a niche beginning is exceptionally worrying. The global statistics as of 30 June 2020 stands at approximately

[2] Source: [Retrieved from].

10.27millions cases with 505.30 thousands deaths according to the European Centre for Disease Prevention and Control (there after known as ECDPC). These statistics illustrate how unprepared the global community was in the face of such an infectious disease. Moreover, they show that the global community never learns from past events and always seem to underestimate events.

According to the statistics from the ECDPC, the first reported confirmed UK case was on 31 January 2020. However, the initial spike in new cases of COVID-19 did not occur until 2 March 2020 when the number of daily confirmed cases rose to 13. Furthermore, this number quickly rose above 1,000 by 22 March 2020, a few days later the number became consistently over 1,000 peaking at 8,719 on 12 April 2020. The total COVID-19 cases and deaths stand at 311,965 and 43,575 respectively as of 30June 2020, thus making the UK the worst country in Europe by pure figures according to the ECDPC. So how did the UK get its policies so wrong and did not react to the COVID-19 pandemic quick enough? The signs were there from the rest of Europe; Italy, for instance, spiked to over 1,000 new cases on 8 March 2020. So, the UK had a window of 14 days to prepare; yet the UK's government did not react until 12 March 2020, according to (Hunter, 2020). Remember, the number of daily new cases rose to more than ten on 2 March 2020; thus, the UK's government remained inactive on the COVID-19 front for ten days after. According to (Hunter, 2020), even then there was no action or recommendations. It was not until 16 March 2020 that the UK's government gave sound advice as conferred by (Hunter, 2020). However, actions did not come until 18 March 2020 when based on the guidance of a medical report by Imperial College schools were closed, as stated by (Hunter, 2020). Nevertheless, the law enforced social distancing and lockdown orders did not come until 23

March 2020, when the total number of cases has risen above 5,000.

The lockdown order meant the closure of non-essential businesses, only food retailers, pharmacies and banks could open. According to a weekly report by Price Waterhouse Coopers dated 13 May 2020, the impact on GDP is likely to be between 5 and 10%. Furthermore, the report forecasts a budget deficit of 10 to 15% of GDP, thus having a significant impact on the total debt. Remember, the deficit ceiling is 3% of GDP to maintain sustainable long-term fiscal policies. The report points to 28% of the workforce furloughed as a possible reason for the low impact on the unemployment rate. However, this is likely to change because of the lockdown impact on the financial status of many organisations.

While there can be no doubt that the Covid-19 pandemic did affect the financial markets, we are under no illusion that any impact pales into insignificant in comparison to the effect on the general public and NHS staff. As so elegantly put by (Wren-Lewis, 2020, p.109), "*It is worth saying at the start that the bottom line of all this for me is that the economics are secondary to the health consequences for any pandemic that has a significant fatality rate.*" However, as hinted by (Wren-Lewis, 2020), financial economics is a vital subject in its own rights, and as a warning not to take drastic actions that do not positively influence the mortality nor infectious rate. Moreover, it is hard not to analyse the impact of Covid-19 on a vital sector of Western capitalism, the financial markets. Nevertheless, as (Wren-Lewis, 2020) states, there is no meaningful trade-off between the reduction on the mortality rate and the GDP or financial market.

According to (Baker *et al.*, 2020a), the impact of Covid-19 on the equity market was unprecedented; indeed, very few episodes can match the high volatility levels or loss. At its lowest on 23 March 2020, the FTSE 100 has loss 2,548.6, an

unprecedented 33.79%, of its value since 31 December 2019. thus, there is a requirement to analyse market participants behaviour during the COVID-19 pandemic. Moreover, the psychological impact on the market participants reactions may provide clues as to the behaviour of the population during the COVID-19 pandemic. During any event that has a considerable adverse effect on the mindset of any human, the critical behavioural trait is fear. However, there is anobligation to explain the behavioural reasonings influencing the fear reactions during this pandemic. Hence, this article will use behavioural economics to explain the impact on market participants.

The main contribution of the paper is the uncertainty behavioural factor model which gives an illustrative view of the factors influencing the decision-making process of market participants during a period of uncertainty. It shows the influence of behavioural psychological and emotional factors, such as biases and heuristics, on the market participants. It also illustrates the effect of events and external factors/actors on the decision-making process. There is a definite requirement to analyse these factors/actors to understand the actions of the market participants. Therein lays the key to the second contribution of the model, the model is derived to illustrate the impact of such events and external factors/actors.

Another crucial side contribution to the model is the derivation of four new heuristics and biases in the explanation of the impact of the Covid-19 pandemic:

- Relative Time Influence bias is the tendency to let the most recent past event or information cloud a judgement. The influence diminishes with time as new events or information occurs. This bias is connected to the event-time conjuncture.

- Political-effect heuristic is the tendency for the actions or inactions of policymakers to affect the decision-making process of the market participants.
- Media Effect heuristic is the tendency to associate extreme events with TV programmes or films.
- Brexit Effect heuristic is the tendency to concentrate on Britain's exit of the EU disregarding all other information or events. Since Brexit is the most recent past event, thus the Brexit effect is a by-product of the relative time influence bias.

However, there remains a requirement to test for these heuristics and biases in the real world. The tests should be implemented in questionnaire-based research to analyse the response from a wide range of the population.

The secondary contribution of this paper is the behavioural reaction analysis of the market participants to the Covid-19 pandemic. There have been a few papers on the impact of the Covid-19 pandemic on the financial market:

- (Albulescu, 2020), study the effect of the announcements on the volatility of the financial market.
- (Baker *et al.*, 2020a), analyse the impact of the policy responses on the US equity.
- (Corbet, Larkin & Lucey, 2020) examine the contagious effect in the financial market.
- (Ramelli & Wagner, 2020) study the equity market reactions.
- (Zhang, Hu & Ji, 2020) research the impact of country and systemic risks on the global financial markets.

However, the key to understanding the impact of the Covid-19 pandemic on the financial market is thru the analysis of the behavioural factors and external factors/actors influencing the decision-making process. The other critical element to consider is the context in which the decision is taken; the key here is the effect of any past events on the current environment. In the case of the Covid-19 pandemic

effect on the UK's financial market, the white elephant in the room is the ongoing Brexit process.

In essence, our uncertainty behavioural factor model illustrated the mixture of cognitive and emotional biases and heuristics influencing the Covid-19 pandemic. Additionally, the model highlighted the impact of external factors and actors on the financial market during events such as the Covid-19 pandemic. Moreover, it demonstrated a principal idea in the behaviour of humans in general and market participants in particular; the impact of an information or event diminishes with time. The critical issue is that the most recent event often clouds the action of the actors during the event; during the Covid-19 pandemic, we suspect that Brexit did cloud the actions of the actors in the UK to a certain extent.

To a certain extent, the Covid-19 pandemic did impact the global affairs like no other events in the past 60 years. Whether the Covid-19 pandemic could be classified as a black swan event depends on the initial assumptions. Indeed, in terms of global viral pandemics, there were two such cases during the last century: the 1918 Spanish Flue and 1957 influenza. Moreover, the economic impact of the pandemic is often overstated in comparison to other recent economic crises such as the global financial and Eurozone debt crises. However, the key is the speed at which the Covid-19 pandemic was able to freeze everyday life and hike uncertainty, globally. This speed was the influential factor in the volatile global markets. And although many will point to the Dow Jones dropping 15% approximately in 1957, it is debatable whether the decline was entirely due to the influenza pandemic. The "overreaction" by market participants during the Covid-19 pandemics meant that on 23 March 2020, the FTSE 100 fell by an unprecedented 33.79% since 31 December 2019.

The reactions of the market participants during the pandemic, once again point to the lack of communication and inactions by governments seen in most recent crises. However, the UK's government did fix the issue later in the pandemic by acting firmly and communicating more often. Yet the actions were too late to reduce the impact of the virus, which made the UK the worst affected country in Europe. With potentially a second wave coming over the next few months, we advise any government to communicate effectively and act fast and stringently on both the health and economic fronts.

Firstly, the paper lays the foundation of the uncertainty behavioural factor model, reviewing the theory of behavioural economic underpinning the model. In the next section, we discuss the Covid-19 pandemic and the UK's response. We follow on with a brief analysis of the impact on the UK's economy, including a review of the economic policy and consumers response. Next, we analyse the Covid-19 effect on the behaviour of market participants in the equity market. Finally, we conclude with a summary of the theoretical underpinnings of the model and impact of Covid-19 in general and on the behavioural factors influencing the decision-making process of market participants.

A brief review of the theories influencing the uncertainty behavioural factor model

As illustrated by Figure 1, there is an essential factor to consider in the analysis of the reaction of the financial markets to an uncertain event, the psychological impact on the market participants depend on the external factors such as economics, finance, policy, international affairs, and others such as health or natural. For the psychological impact, we need to delve into the theory at the heart of our model: the theory of behavioural economics. Influenced by

the seminal works of Tversky and Kahneman: (Tversky & Kahneman, 1973), (Tversky & Kahneman, 1974) and (Kahneman & Tversky, 1979); basically, the theory dictates that it is the reactions of market participants that drive the trend in the market.

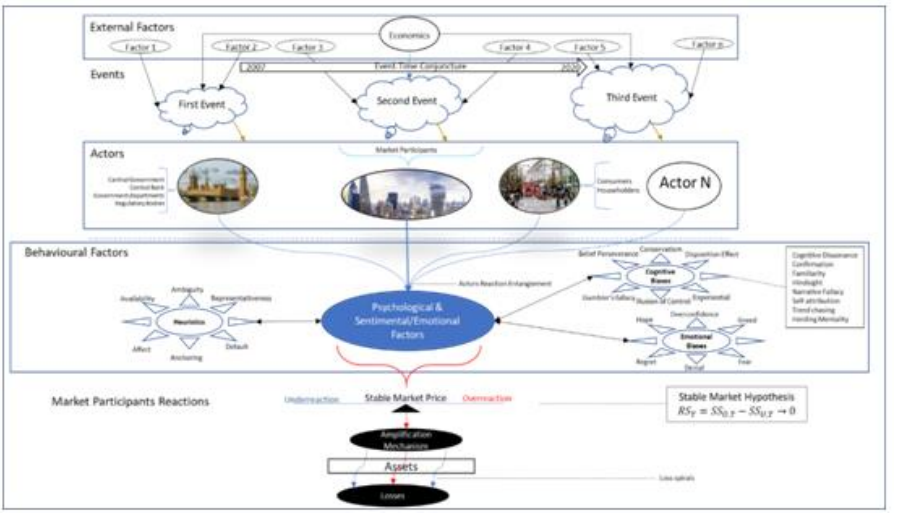

Figure 1. *The General Uncertainty Behavioural Factor Model*

Before we could delve onto the main factors of behavioural economics theory influencing our model, there is a need to review the primarily model underpinning behavioural economics; the prospect theory of (Kahneman & Tversky, 1979) and (Tversky & Kahneman, 1992). Market participants often violate the predictions of the traditional model of decision making, the theory of expected utility introduced by (von Neumann & Morgenstern, 1944). As proposed, the expected utility theory argues that rational market participants should always opt to the option which maximises their earnings taking account of their risk aversion behaviour. The issue is market participants do not always make choices according to the rational choice behaviour underlining the expected utility theory. Two

critical effects come into play when market participants are deciding amongst several risky option: certainty and isolation effects. The certainty effect states that market participants often underweight uncertain outcomes in comparison with specific results. Thus, contributing to risk aversion and risk-seeking in situations of individual gains and losses, respectively as hinted by (Kahneman & Tversky, 1979). Conversely, according to (Kahneman & Tversky, 1979), the isolation effect contend that in general market participants discard shared components amongst all prospects under consideration. Furthermore, as argued by both (Tversky & Kahneman, 1992) and (Barberis, 2013b), market participants are loss avert meaning they are more sensitive to loss than to gains of similar margins, no matter how small the losses are.

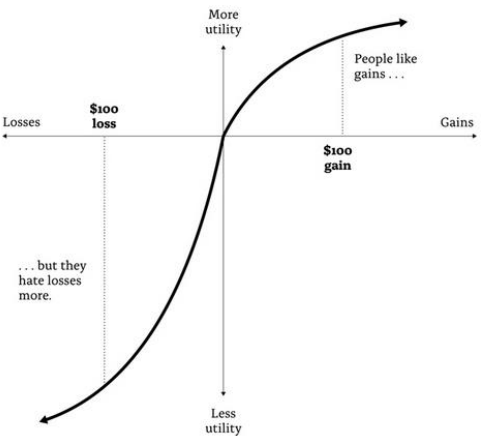

Figure 2. *Prospect Theory*

The prospect theory introduced by Kahneman and Tversky over two influential papers, (Kahneman & Tversky, 1979) and (Tversky & Kahneman, 1992), was an attempt to resolve the violations of the expected utility theory, as stated by (Barberis, 2013b). The original prospect theory, as illustrated by Figure 2, derived in (Kahneman & Tversky,

1979), did overcome the main issues presented by the expected utility model. Additionally, (Kahneman & Tversky, 1979) provided some essential insights into the working of the theory and is regarded as the influential paper on behavioural economics.

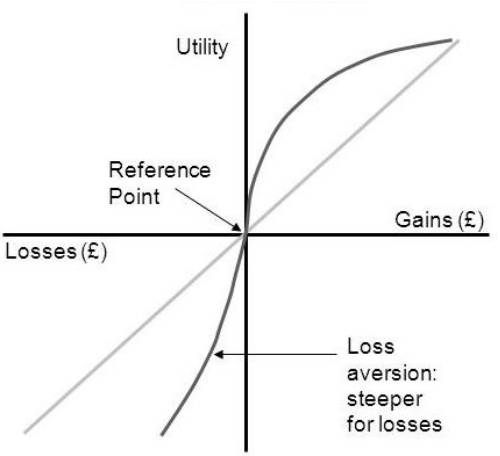

Figure 3. *Cumulative Prospect Theory*

However, the prospect theory, as derived by (Kahneman & Tversky, 1979) violated the first-order stochastic dominance. In overcoming this issue, (Tversky & Kahneman, 1992) proposed a new version of the prospective theory called cumulative prospect theory which employs a cumulative rather than separable decision weighing function, as illustrated by Figure 3. As derived by (Tversky & Kahneman, 1992), the prospect theory relies on four key characteristics of the human decision process:

- Reference dependence, people evaluate the value of gains or losses from a reference point.
- Loss aversion, people are more sensitive to losses than to gains as indicated by (Kahneman & Tversky, 1979).
- Endowment effect, people demand more to give up an object than they are willing to pay.

- Diminishing sensitivity, the marginal value of both gains and losses decreases with their size.

The influencing idea behind behavioural economics is that market participants are not homo economicus; they are homo sapiens, a point illustrated by (Thaler, 2016). The key here is the reaction by market participants to news or events relative to the fundamental price as derived by the efficient market hypothesis of (Fama, 1965) and (Malkiel, 1962). As put by Bernard Baruch:

"What is important in market fluctuations are not the events themselves but the human reactions to those events."

Moreover, as argued by (Barberis, Shleifer & Vishny, 1998), empirical evidence shows that market participants underreact to news and overreact to a series of good or bad news. The definition of underreaction is that average returns on any asset following good news is higher than average returns following bad news, which means that market participants underreact to the good news. Analogous to underreaction, the definition of overreaction takes the shape of average return following a series of good news is lower than the average return following a series of bad news, which means that market participants overreact to good news. Moreover, in both cases, the opposite reactions could also be correct.

Additionally, behavioural economics attempts to describe the psychology and sentiment influencing the decision-making process of the market participants based on several heuristics and biases. As argued by (Tversky & Kahneman, 1974), there is a constant overload of daily news and information; hence the requirement to simplify arises, this simplification is often called a heuristic. However, a heuristic may be a useful procedure in dealing with information overload; yet, there is the danger that using heuristic

techniques to make decisions could lead to misjudgements. Listed below are some general heuristics:

- Affect is the tendency to make decisions based on emotional responses. (Finucane *et al.*, 2000)
- Ambiguity effect implies that people tend to select options for which the probability of a favourable outcome is known, over an opportunity for which the likelihood of a favourable outcome is unknown (Ellsberg, 1961; Heath & Tversky, 1991).
- Anchoring is the tendency to hold on to a belief and base any future judgements on it as a reference point (Tversky & Kahneman, 1974).
- Availability is the tendency to rely heavily on events from memory. Since not all memory is available at any given time, this could lead to short-termism or salient event heavily distorting beliefs (Tversky & Kahneman, 1973).
- Default is the tendency to do nothing if there is a default option (Gigerenzer, 2008).
- Representativeness is the tendency to decide on past information, disregarding current fundamental information (Tversky & Kahneman, 1974).

Conversely, a bias, generally, is a disproportionate probability placed in favour or against an idea or thing. As hinted by (Tversky & Kahneman, 1974), a bias could cloud the judgement of market participants leading to the wrong decisions. According to (Ackert, Church & Deaves, 2003), there are two main types of biases: cognitive and emotional. Cognitive biases refer to the limitation of any individual's abilities to encode, process, and retrieve information. Identified by (Tversky & Kahneman, 1974) as a critical behavioural factor influencing the decision-making process, common cognitive biases include:

- Belief perseverance is the tendency to tightly hold on to a belief for too long despite the availability of new information to the contrary (Lord, Ross & Lepper, 1979).
- Cognitive dissonance is the tendency to feel discomfort when an action conflicts with the positive self-image (Festinger, 1962).
- Confirmation is the tendencyto pay close attention to information that confirms their belief and ignore information that contradicts it (Wason, 1960).
- Conservatism is the tendency to revise an opinion insufficiently when new information becomes available (Edwards, 1982).
- Disposition effect is the tendency to sell "winning" assets too early or hold on to "losing" assets too long (Shefrin & Statman, 1985).
- Experiential is the tendency to believe recent events are increasingly likely to occur again; it is an extension of the representativeness heuristic (Tversky & Kahneman, 1974).
- Familiarity refers to the tendency of buying familiar assets despite the advantages of diversification. (Heath & Tversky, 1991) show in a series of experiments that when people are faced with a choice between two gambles, they will pick the one that is more familiar to them. Moreover, they will sometimes pick the more familiar bet even if the odds of winning are lower!
- Gambler's fallacy is the erroneous belief that if a particular event occurs more(less) frequently than usual during the past, it is less(more) likely to happen in the future (Tversky & Kahneman, 1974).
- Herd mentality refers to the tendency to follow and copy others (Bikhchandani & Sharma, 2000).
- Hindsight is the tendency to believe they predicted the outcome of a past event before it occurred; equally,

they could, also, believe that they could forecast the future outcome (Fischhoff & Beyth, 1975).

- Illusion of Control is the tendency for people to overestimate their ability to control events; for example, it occurs when someone feels a sense of control over outcomes that they demonstrably do not influence (Thompson, 1999).
- Narrative fallacy refers to the tendency to let a good story cloud the decision-making process (Taleb, 2008).
- Self-attribution is the tendency to attribute success to personal skills and failure to external factors beyond their control (Miller & Ross, 1975).
- Trend chasing is the tendency to chase past good performance on the belief that it will continue (Baker & Ricciardi, 2014).

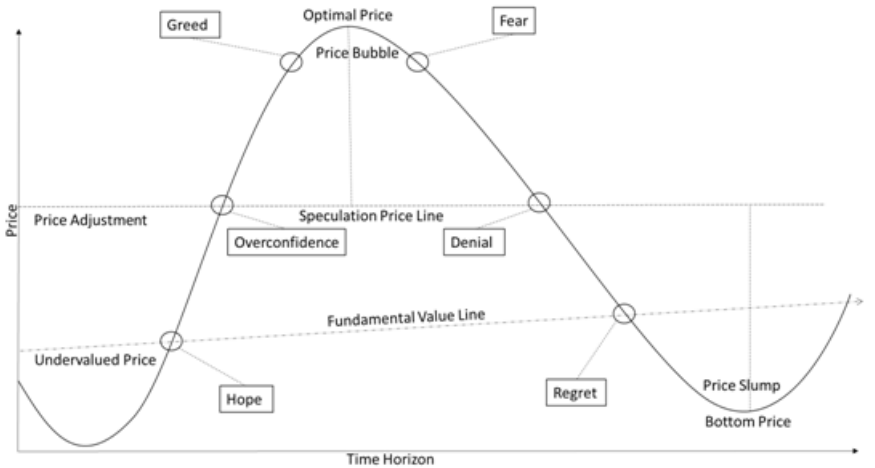

Figure 4. *The Financial Cycle of Emotions*

As argued by (Ackert, Church & Deaves, 2003), behavioural economics has mainly concentrated on cognitive biases. In contrast, emotional biases often refer to the inability of an individual to separate emotions from the decision-making process. As stated by (Ackert, Church &

Deaves, 2003), there is an agreement on the states of emotions: anger, hatred, guilt, regret, fear, pride, elation, joy and love. Moreover, as exemplified by (Ackert, Church & Deaves, 2003), emotional biases can significantly affect the decision-making process; furthermore, they can enhance the market participant's ability to make rational decisions. There are many emotional biases; however, the fundamental biases concerning our model are as illustrated by Figure 4.

1. Hoperefers to the tendency to feel that the ultimate goal is achievable or the event will transpire to the best.
2. Overconfidence refers to the tendency to overweigh the subjective confidence relative to the objective accuracy of the judgement. In contrast, underconfidence is to underweigh the subjective confidence relative to the objective accuracy of the decision. Although overconfidence is common, it is not universal (Griffin & Tversky, 1992).
3. Denial refers to the tendency to repudiation or disavowal of aspects of external realitythe individual does not want to know about to diminish or avoid the painful effects associated with that reality (Auchincloss & Samberg, 2012).
4. Regret is the tendency to harbour negative feelings as a result of comparing the real-world outcomes or state of events with those of an idealised world or an alternative better option. However, as the old quote says:

"Fear is only Temporary; Regret lasts Forever."

Intriguingly, of all the emotional states, two of the most prominently linked are the opposites scale emotions of fear

and greed. As put by Bertrand Russell[3] and Erich Fromm[4] respectively:

"Neither a man nor a crowd nor a nation can be trusted to act humanly or think sanely under the influence of fear."

"Greed is a bottomless pit which exhausts the person in an endless effort to satisfy the need without ever reaching satisfaction."

As explained by (Lopes, 1987) and (Shefrin & Statman, 2000), fear is determined by an overweighing of the worst-case scenario probabilities relative to the best-case scenario; while greed is derived by an overweighing of the best-case scenario probabilities corresponding to the worst-case scenario.

An essential element in any pricing uncertainty model over time is that price changes, in our model, we have theoretically divided the price changes into three areas, as illustrated by Figure 4:

- Undervalued Price
  Below the fundamental value line, the price as determined by all the fundamental information of the asset as dictated by the Efficient Market Hypothesis, see (Fama, 1965) and (Malkiel, 1962).
- Price Adjustment
  The problem is that the price of any asset can deviate from the fundamental value by a significant amount over the short to long run. Essentially, as hinted by (De Bondt, 2000), the overreaction hypothesis states that sometimes market participants tend to disproportionately react to information (fundamentals and news) causing a temporarily and

[3] Russell, B., (1950). *Unpopular Esasays*. NewYork, New York, USA: Simon and Schuster

[4] Fromm, E., (1941). *Escape from Freedom*. NewYork, New York, USA: Farrar & Rinehart

dramatic deviation from the fundamental value. Usually, the price does revert to the fundamental value within a short-medium period as market participants digest the information.

- Price Bubble
  Essentially, as hinted by (Barlevy, 2007), the popular notion is bubbles are initiated by rapid upwards pressures on the price of a particular type of asset or index in a short interval of time, eventually causing downward pressures to correct the price or more dangerously a collapse in the price. In simple terms, as hinted by (Blanchard & Watson, 1982), a popular notion defines a bubble as a significant price deviation from the fundamental value that is unjustified by the information available at the time.

Conversely, an alternative argument is that the type and intensity of uncertainty dictates the actions of humans; in which case, there is a need to identify the uncertainty. Generally, uncertainty is when a person cannot assign a probability to an event or action, making any decision difficult. However, if this is the case, then any event or activity may be regarded as difficult. The difference is in the type and intensity, events such as Covid-19 and Brexit were on a different platform to the uncertainty seen in "normal" market conditions. There are two types of uncertainty which are of interest here:

- Black swan effect, an unpredictable event with significant consequences that in hindsight could have been predictable (Taleb, 2008)
- Knightian uncertainty, a condition where the probabilities of a given situation cannot be determined and thus cannot be assigned to the asset (Knight, 1921).

Further, during an event that invokes extreme uncertainty, the ambiguity on the financial market is likely to lead to the Ellsberg paradox. (Ellsberg, 1961) identified that

humans tend to reject unknown in favour of known risks, even though the ambiguous option could lead to more substantial earnings.

There are several assumptions influencing the model. The first assumption, as shown by Figure 1; the time-event conjuncture dictates that the impact of any event on market participants action diminishes with time. As suggested by (Tversky & Kahneman, 1973), the availability heuristic dictates that humans only focus on the relevant information regarding the probabilities of events during the decision making process. Moreover, they often concentrate on the most recent developments; thus meaning that as events become older, they become less relevant to the decision-making process. Furthermore, as hinted by (Smales, 2015), the impact of news on investor sentiments diminishes over time.

Additionally, since volatility is essentially the reaction of market participants to events; thus, another crucial factor is the distinction between volatility over the long and short-run. As advocated by (Pastor & Stambaugh, 2012) and (Engle & Lee, 1999), this means that market participants react significantly more in the short run than the long-run. Therefore, essentially hinting that the time-event conjuncture dictates as time moves forwards, the importance of an event diminishes as the epicentre for the decision making process. A new epicentre arises replacing the existing one.

The second assumption is that all significant crises impact the economic factors as illustrated by Figure 1. There is evidence from several research papers that all major events have an impact on the economy of a country. According to (Feldstein, 2009) and (Taylor, 2009), the global financial crisis had a significanteffect on the economy. Moreover, as stated by (Genschel & Jachtenfuchs, 2018) and (Jones, Kelemen & Meunier, 2016), the eurocrises had a significant impact on the economies of the Eurozone. Additionally, as stated by

(Fakhry *et al.*, 2018), the Tohoku earthquake of 2011 had a substantial effect on the Japanese economy. Further, Brexit is likely to have a considerable impact on the UK's economy as suggested by (Levell *et al.*, 2018) and (Hantzsche, Kara & Young, 2018). Lastly, as we will see later, there is mounting evidence that the Covid-19 pandemic is having a significant impact on the economy.

The third assumption is probably the critical factor underpinning the model; according to (Mallard, 2016), many behavioural economics models separate between bounded rationalityas defined by (Simon, 1972) and the psychology of the actors as derived by (Kahneman & Tversky, 1979). We argue while this separation is perfectly reasonable, it does tend to secede between the reasoning of psychology and the elegant mathematical backing of bounded rationality.We argue that we need both treatments to understand the behaviour of actors in the global financial market.

A vital factor is the concept of the fundamental price influencing the efficient market hypothesis. Since it is the actions of market participants that move the price; hence, the fundamental price is really the point of stability between the over and under reactions to the event or information. Conversely, the fourth assumption is themodel dictatesthat the overall market price is the balanced reaction of the market participants. As hinted in Figure 1, at the primary level, the market price is determined by the reactions of the market participants. Hence, the price is the scale of the over and under reactions to any event or information. Thus, depending on the scale, the price could be stable meaning that it is at the fundamental value or could lead to an overall overvaluation/undervaluation in the price.The overreaction/ underreaction scalein Figure 1 is the s*table market hypothesis* which dictates that the reactions of the actors in the market determine the price of all assets.

An essential factor in Figure 1 is the position of the stable market hypothesis (SMH), which dictates that the SMH is determining by the emotional and cognitive elements of the decision-making process. The fact that it is at the mouth of the bottom tier of our model is suggestive that many internal and external factors influence the SMH. Theoretically, market participants are influenced by the generalised context of the market at any given time; this has been proven by numerous events and actions of external and internal actors over time. The latest is Covid-19 and the following activities of the government and public; which impacted on the behaviour of market participants as hinted by (Albulescu, 2020), (Baker *et al.*, 2020a), (Corbet, Larkin & Lucey, 2020), (Ramelli & Wagner, 2020) and (Zhang, Hu & Ji, 2020). The SMH is derived from a simple top-level equation as illustrated by Figure 1, which simply put is Equation 1.

$$RS_T = SS_{O,T} - SS_{U,T} \to 0 \quad (1)$$

Condition 1: $RS_T \gg 0$, an overreaction

Condition 2: $RS_T \ll 0$, an underreaction

Equation 1 simply states that the reaction of market participants in any given time is the deviation between the overreaction and underreaction to a given event or information depending on the emotional and cognitive behaviour. Thus, suggesting that as this deviation approaches zero, the price approaches the fundamental value at which the market is regarded as stable. However, if the market deviation is significantly negative or positive,meaning the market price is diverging from the fundamental value. Hence,the market is considered to be either underreactive or overreactive, respectively.

A review of Covid-19

In a BBC 2 Horizon Special on the Covid-19 shown on Tuesday, 19 May 2020 at 21:00; Dr Chris van Tulleken pointed to several studies done as late as 2018 about the potential impact of a new coronavirus pandemic. These studies, such as (Afelt, Frutos & Devaux, 2018) and (Bailey *et al.*, 2018), were warning of a new coronavirus pandemic with an epicentre of Eastern Asia. As stated by (Afelt, Frutos & Devaux, 2018, p.1) "*The risk of emergence of a novel bat-CoV disease can therefore be envisioned*". Furthermore, (Bailey *et al.*, 2018, p.1), states "*During the last two decades, scientists have grown increasingly aware that viruses are emerging from the human–animal interface*".Moreover, as illustrated by Figure 5, the predicted location of the new coronavirus was central China based on historical cases. (Bailey *et al.*, 2018) warn that the complicated nature of these viruses requires coordination between all stakeholders. According to (Afelt, Frutos & Devaux, 2018), the increasing viral risk is not the result of a significant change in the biological problem; instead, a change in the environmental factors. Of which, the paramount consideration is deforestation in Asia, with an approximate 30% loss in forest area, according to (Afelt, Frutos & Devaux, 2018, p.2). Thus highlighting the issue, coronaviruses have a significantly increasing chance of spreading to humans in areas of reducing forests.

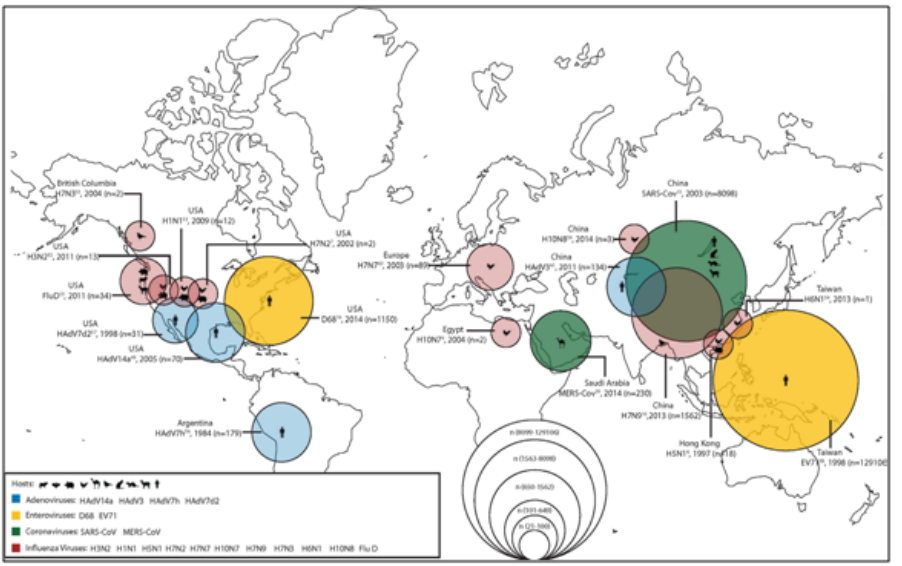

Figure 5. *The Geographical of the Viruses (Bailey et al., 2018, p.2)*

According to (Afelt, Frutos & Devaux, 2018), a large proportion of the variants of coronaviruses start life in bats. However, with the possible exception of the Australian Bat Lyssavirus and Duvanhage virus; there is no clear, direct virus link between bats and humans. Thus, as stated by (Afelt, Frutos & Devaux, 2018), there is a high probability that the connection is via another animal. The increased deforestation activity is impacting on the landscape of the bats, which increases the chance of viruses jumping from bats to other species. Moreover, as hinted by (Afelt, Frutos & Devaux, 2018), since deforestation brings animals and humans into connection; this increases the chance of species to human transmission of the coronavirus.

As stated by (Bailey *et al.*, 2018), coronaviruses are single-stranded ribonucleic acid viruses with large genome in which mutation are prevalent. According to (Bailey *et al.*, 2018), there are six main variants of coronavirus, split into two effects: mild upper respiratory tract infections and severe acute respiratory syndrome (aka SARS). The Covid-19

is a member of the second group, SARS. According to (Bailey *et al.*, 2018), the SARS variant emerged from the Guangdong Province, China, in 2003. However, according to the WHO, the total number of cases worldwide was 8,098 with 774 deaths. According to (Bailey *et al.*, 2018) and as indicated earlier, the SARS originally came from bats; however, the transmissions to humans was from other animals. Conversely, although there has been research to find a vaccine and, according to (Bailey *et al.*, 2018), initial optimism pointed to a vaccine being ready for human clinical trials by 2017; yet there has been limited progress.

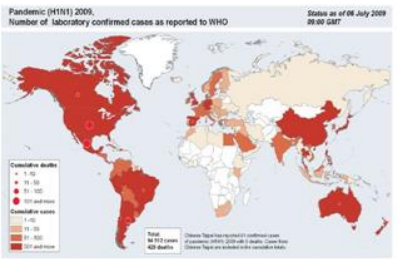

Figure 6. *The Swine Flu (2009) Pandemic Global Map*

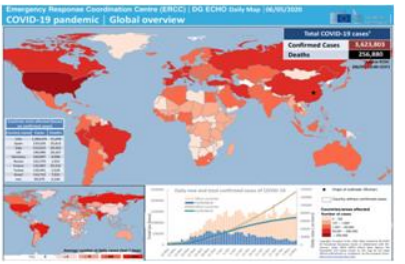

Figure 7. *The Covid-19 Pandemic Global Map*

The Covid-19 is the first pandemic to be genuinely global in over 100years. The keyword being global, of course, there have been pandemics viruses before in the 21st century but none on this global scale. As illustrated by Figure 6 and Figure 7, the Swine flu pandemic was globally insignificant in comparison to the current Covid-19. Furthermore, the Swine Flu pandemic of 2009 had an R0 between 1.4 and 1.6; the current Covid-19 pandemic has an R0 of 2.0 to 2.5, according to (Coburn, Wagner & Blower, 2009) and (Kucharski *et al.*, 2020) respectively.

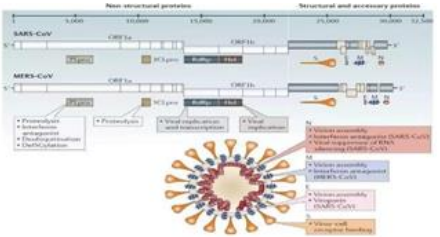

Figure 8. *The Basic Structure of the Coronavirus (Zumla et al., 2016, p.330)*

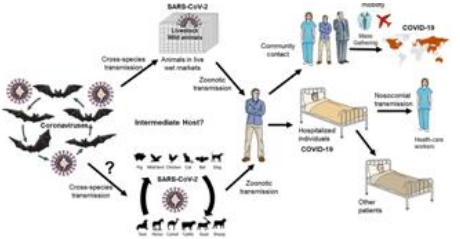

Figure 9. *Nature of Covid-19 (El Zowalaty and Järhult, 2020, p.4)*

The Covid-19 is a variant of the SARS-CoV meaning its basic structures is as illustrated by Figure 8. As Figure 9 shows, Covid-19 is a high infectious zoonotic virus variant; thus, it is an animal to human transmittable virus. As described by (Zumla *et al.*, 2016), the basic structure contains four main parts or proteins: spike glycoprotein (S), envelope protein (E), membrane protein (M) and nucleocapsid protein (N). According to (Zumla *et al.*, 2016), the virus enters the body thru the respiratory system and into the lungs; once in the lungs, it takes over the cells. This invasion develops issues with the respiratory system workings, hence leading to the symptoms illustrated by Figure 10 and described by (Rothan & Byrareddy, 2020) and (Sohrabi *et al.*, 2020) including dry cough, fever and diarrhoea.

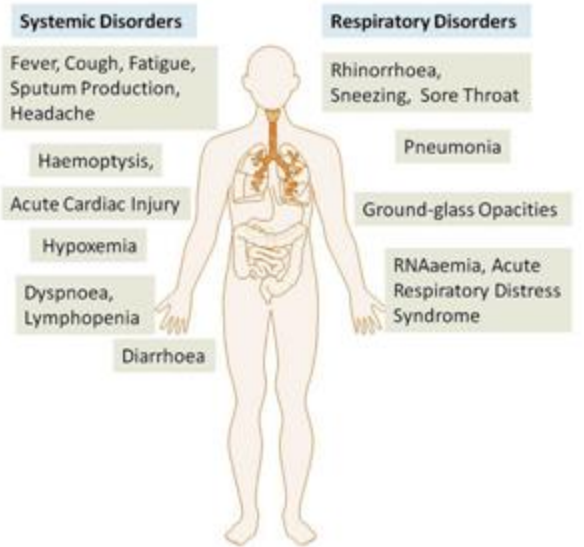

Figure 10. *The Symptoms of Covid-19 (Rothan & Byrareddy, 2020, p.2)*

The danger is that Coronaviruses are highly reiterated viruses, hence the likelihood of a second wave during the Autumn/Winter of 2020/2021 is high. As Dr Ranieri Guerra, WHO assistant director-general for strategic initiatives argues on 26 June 2020: "*The comparison is with the Spanish Flu, which behaved exactly like Covid: it went down in the summer and fiercely resumed in September and October, creating 50 million deaths during the second wave.*" Therefore, the real impact of Covid-19 will not be known until we developed an effective vaccine to stop the spread of the virus.

A Review of the UK's Covid-19 Response

As argued by (Hale *et al.*, 2020), the governments responses have varied substantially in the adoption and pace. However, the UK's Covid-19 response was to all observers is a "reactive" retort as identified by several studies such as (Cowper, 2020), (Hunter, 2020) and (Watkins, 2020). Moreover, as stated by (Cowper, 2020), many criticised the UK's government for being slow to respond to

the Covid-19 pandemic. Additionally, according to (Cowper, 2020), the official Covid-19 response was mix in the early stages of the pandemic. Furthermore, as hinted by (Cowper, 2020), the lack of communication from the UK's government during the early stages was glaring, partially due to a mistrust towards the media since the 2019 general election. However, one key element during the Covid-19 pandemic was the change in the general public perspective towards "experts", as hinted by (Cowper, 2020). Conversely, as illustrated by Figure 11 and Figure 12, the UK had the highest total of Covid-19 cases and deaths amongst Europe. So, what happened?

Figure 11. *European Map Chart of Total Covid-19 Cases*

Source: European Centre for Disease Prevention and Control, Dated: 30/06/2020

Figure 12. *European Map Chart of Total Covid-19 Deaths*

Source: European Centre for Disease Prevention and Control, Dated: 30/06/2020

According to (Hale *et al.*, 2020), the UK's government was the third slowest to respond, among the observed European countries. Damningly, according to the statistics on government response stringency index by the Blavatnik School of Government, University of Oxford; the UK was the slowest to implement stringent policies. Furthermore, that response came after the number of confirmed cases has reached 6,550 with 889 deaths on 23 March 2020, which means that the UK's government reacted stringently 17 days after the first death as illustrated by Figure 13 and Figure 14.

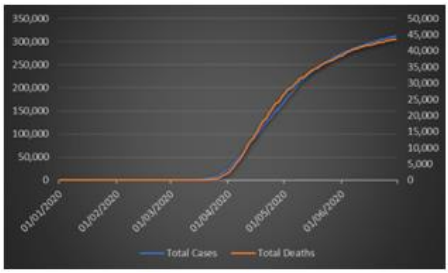

Figure 13. *UK Total Covid-19 Cases and Deaths,*
Source: European Centre for Disease Prevention and Control, Dated: 30/06/2020

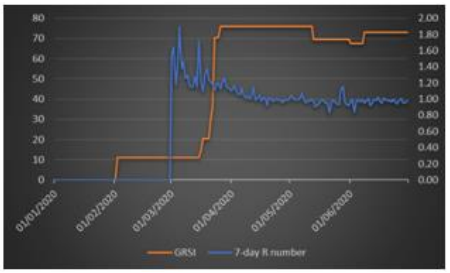

Figure 14. *UK Covid-19 Government Stringency Index and calculated 7-day R-number,*
Sources: Oxford COVID-19 Government Response Tracker (Blavatink School of Government) and European Centre for Disease Prevention and Control, Dated: 30/06/2020

As hinted by (Hunter, 2020), the UK's response in the early stages of the Covid-19 pandemic was a little too late. Moreover, as identified by (Hunter, 2020), in the steps of the government response, there was no appetite for banning mass gathering. Many sporting events continued unhindered; it was left to the football authorities to postpone the matches until further notice. As stated by (Hunter, 2020), otherwise it was business as usual, despite the warnings from the medical profession as far back as the initial publication of data from China in January. The inaction was utterly out of step with almost every other European country; thus, according to (Hunter, 2020, p.1), the British government policy amounted to a "Keep Calm and Carry On" approach. This approach was believed to have come from the advice of a group of behaviourist scientists. However, as noted by (Hunter, 2020), it is thought that none of the government officials bothered asking does this advice account for a highly infectious virus.

As stated by (Mahase, 2020), the UK's government changed tactics when a study by Imperial College London[5] showed that Intensive Care Unit requirements were approximately twice as initially thought under current government containment policies. The containment policy would have put enormous constraints on the ability of the NHS to operate and resulted in about 260,000 deaths. The study compared the government's containment policy with a second policy involving social distancing of the entire population and tougher home isolation; the crucial factor is even under the second policy, the impact would still be far worst than expected, the study found. So in a reversal of policy, the government began a policy of social distancing and closed schools and universities by mid-March.

According to (Iacobucci, 2020) and (Thornton, 2020), the UK's government implemented a complete lockdown policy on 23 March 2020. As noted by (Iacobucci, 2020), most doctors and scientists supported the lockdown policy as a crucial step to saving lives. In announcing the procedure, the prime monster said the population must stay at home unless they work to an essential service, shop for essentials, exercise twice a day and access medical care. Also announcing that the closure of non-essential shops; following on from the announcement that gyms, restaurants and bars are to close for the foreseeable future in the previous week As alluded by (Thornton, 2020), the impact on the NHS of the lockdown was positive.

The issue at the heart of the dilemma facing the UK's government is that the first option, herd immunity, would cost lives and the second option, lockdown, would be costly for the economy as suggested by (Sibony, 2020). We will go into the economic facts in the next sub-section; however, according to (Sibony, 2020), the financial cost would be

[5] the MRC Centre for Global Infectious Disease Analysis

roughly a three base point reduction in the GDP per month. However, this would pale into insignificant on a moral stand against the impact on the NHS and death rate, as reported earlier by the Imperial College London study. As hinted by (Sibony, 2020), in the absence of a medical treatment, any government has only one option to slow down the Covid-19 progression, which is changing the everyday behaviour of the population. Yet changing the daily routine is a tall order, especially in a fully-fledged democracy where freedom of movement is a fundamental right, such as the UK. Yet according to an opinion poll by Opinium for The Observer on 3 May 2020, 4 in 5 thought the lockdown should continue. Furthermore, according to polls conducted by Deltapoll and Ipsos MORI in late April, 66 per cent of the general public believed that the lockdown policy should have been earlier.

Continuing, according to (Cowper, 2020), the support among the general public for the government's response during the Covid-19 was not favourable. As indicated by an opinion poll in the third week of February showed a drop from 63% to 50% approval for the government Covid-19 policies. Moreover, a poll by Opinium in the Observer indicates that the general public believes only the US has done worse than the UK during the Covid-19 pandemic.

Of course, according to (Brodeur *et al.*, 2020), there are other costs to consider other than the economic: governmental trust, educational disruption and population well-being. (Brodeur *et al.*, 2020) analysed the welfare of nine western European countries and US states using data from Google Trend pre and ex lockdown, they also used the same analysis over the same period in 2019 to account for seasonal changes. They found people's mental health may have been severely affected by the lockdown. The result shows a substantial increase in searches with the words boredom and worry, which does not decrease with time.

However, according to (Brodeur *et al.*, 2020), the effect on the well-being depends on the timing of the lockdown. The countries, including the UK, which entered lockdown at a later date experienced a positive impact on the well being. However, the countries which entered lockdown early experienced a negative effect on the well being. Therefore, negativity seems to increase with time.

A Review of the economic factors influencing the UK's financial market during the Covid-19 pandemic

Firstly, we need to review the impact of Covid-19 on the UK's economy. Since, as stated by (Chen, Roll & Ross, 1986) and (Birz & Lott, 2011), financial markets are influenced by economic factors and news. Moreover, as hinted by (Baker *et al.*, 2020a) and (Anoushiravani *et al.*, 2020), the Covid-19 pandemic is highly likely to have an impact on the economy. Hence, we need to understand this effect to appreciate the implications of Covid-19 on the financial market fully.

Before we review the impact of Covid-19, we need to address the elephant in the room: the potential impact of Brexit on the UK's economy. In the past few years, the big question has been what are the consequences of Brexit on the UK's economy. Moreover, the impact depends on whether there is a trade deal or not. According to (Hantzsche, Kara & Young, 2018), the proposed agreement of Mrs May's government would have cost the UK 3.0 per cent in GDP/head by 2030 relative to the UK staying in the EU. The deal proposed by the EU, which included the backstop would have cost the UK 1.9 per cent in GDP/head by 2030 against staying. However, (Levell *et al.*, 2018) differ slightly with GDP/head loss of 1.7% in the long run against staying for Mrs May's deal. According to (Bevington *et al.*, 2019), Mr Johnson's government deal would mean the UK would be

0.8 per cent worse off in terms of GDP/head than Mrs May's deal. The fallout from the Covid-19 pandemic comes against this economic backdrop, which partly explains the somewhat mixed and delayed reaction of the UK's government to the pandemic.

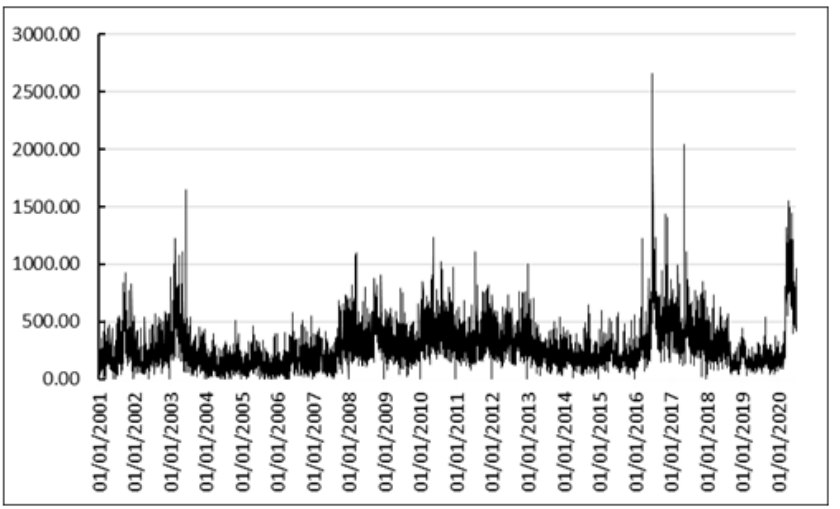

Figure 15. *Daily Economic Policy Uncertainty in the UK*[6]

So how did a health issue morph into an economic crisis? According to (Ozili & Arun, 2020), the answer lies in two pivotal factors thru-which coronavirus stifle economic activity. Firstly, to prevent the virus from spreading, a lockdown policy had to be enforced. Secondly, the exponential rate of infection heightened uncertainty. As illustrated by Figure 15, the levels of economic policy uncertainty during the Covid-19 pandemic reached over 1,500; a scale only witnessed on three previous occasions during the Brexit and war on terror episodes. This level of uncertainty displays the real impact of the Covid-19 pandemic on the UK's economic policy. As implied by

[6] Obtained from [Retrieved from]. on 31st May 2020

(Baker *et al.*, 2020b), during the Covid-19 pandemic, more than half of the loss in GDP is likely to be due to Covid-induced uncertainty. Moreover, as stated by (Fernandes, 2020), the danger is in comparing the Covid-19-induced recession to other recessions in the post-war era; the economic downturn is in essence a double shock to demand and supply. Additionally, according to (Fernandes, 2020), Covid-19 could potentially be the most significant impact on the global economy.

Furthermore, as argued by (Ozili & Arun, 2020), the drivers of the negative effect of Covid-19 on the global economy are fear and uncertainty. Conversely, according to (Wren-Lewis, 2020), the most significant impact on GDP is likely to come due to fear forcing many people to reduce social consumption. Therefore, hinting at the lockdown policies being a substantial hit on the economy. Furthermore, as implied by (Wren-Lewis, 2020), the worry is that fear does not deviate easily.

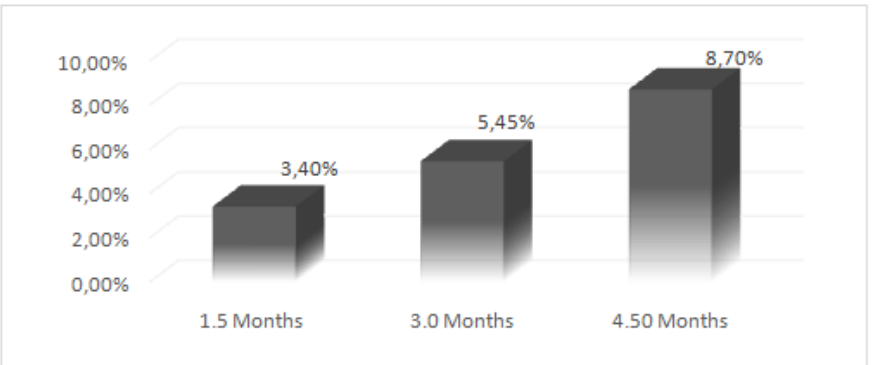

Figure 16. *Impact of lockdown policy during Covid-19*
Source: (Fernandes, 2020)

According to (Fernandes, 2020), a global recession is almost inevitable; the IMF and OECD forecast a 0.1 and 2.9 per cent loss in GDP, respectively. Yet, as suggested by (Fernandes, 2020), both these forecasts underestimate the

impact. (Fernandes, 2020) alludes for varying effects depending on the government policies. For the UK, the consequences is a step ladder varying with the length of the lockdown as illustrated by Figure 16. However, according to (McKibbin & Fernando, 2020), the factors influencing the impact are the severity of the Covid-19 (low, medium or high) and nature of the shock (temporary or permanent). Given that the Covid-19 is now a pandemic, we will only review scenarios 4 to 7 of (McKibbin & Fernando, 2020)[7]. Conversely, the cost to the UK's GDP by Covid-19 as estimated by (McKibbin and& Fernando, 2020) ranges from 1.2 to 6.0 per cent. As illustrated by Figure 17, the UK's GDP could be affected by 6.0 per cent in a highly severe infection rate. Conversely, as of writing the paper, the UK had the worst infection rate.

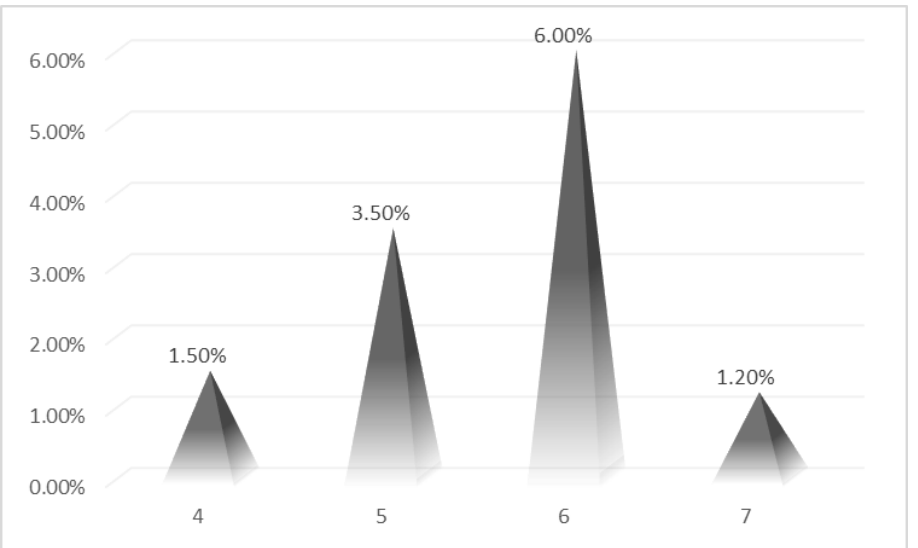

Figure 17. *Covid-19 severity levels impact on GDP*
Source: (McKibbin & Fernando, 2020)

[7] Scenarios: 4 (Low, Temporary), 5 (Medium, Temporary), 6 (High, Temporary) and 7 (Low, Permanent)

In a weekly report by Price Waterhouse Cooper[8] on 27 May 2020, the impact on GDP was forecast to be -7.1 to –13 per cent. Towards the end of 2021, GDP will only be 93.0 - 98.5 per cent of the pre-Covid-19 trend. Furthermore, the budget deficit in 2020/2021 is forecasted to be around 15 – 22 per cent of GDP falling to 5 - 10 per cent of GDP during the fiscal year 2021/2022. According to the report, the macroeconomics data paints an economic picture previously seen during the global financial crisis of 2007/2009. Additionally, a report by the Office for National Statistics in the UK on the impact of Covid-19 on the economy[9] backs this trend pointing to a 5.8% fall in GDP during March 2020, the most significant monthly fall.

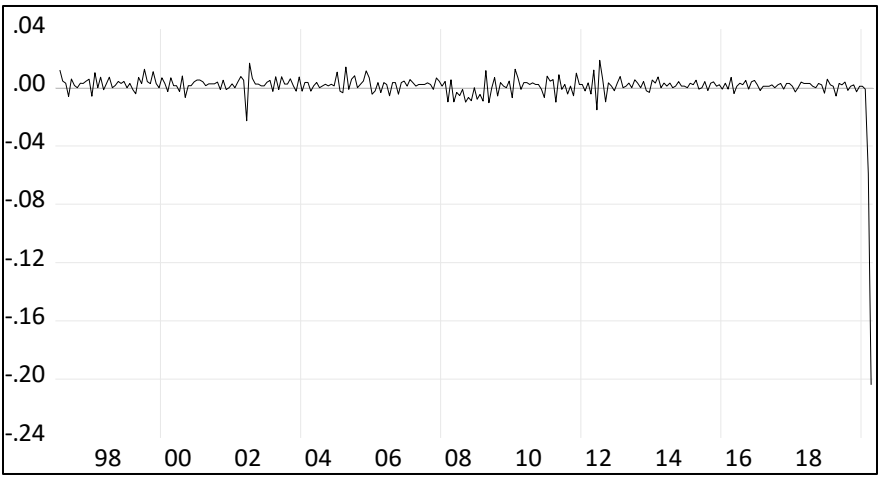

Figure 18. *UK Monthly GDP Index Change (02/1997-04/2020)*

On 12 June 2020, the Office for National Statistics in the UK reported the monthly GDP index to be at 78.9 for April 2020, a fall of 20.38% on the previous month. Moreover,

[8]COVID-19 UK Economic Update, Source: [Retrieved from].

[9]Coronavirus and the impact on output in the UK economy: March 2020. Source [Retrieved from].

March 2020 saw a fall of 5.89%; as illustrated by Figure 18, even the March fall was worse than any on record. These GDP statistics point to the impact being much worse than the worst-case scenario predicted by many economic organisations and economists. Furthermore, the macroeconomics data seem to be hinting at a worst impact on the UK's economy than the global financial crisis which shrank the economy by 5.92% during the period between May 2008 and March 2009. It says a lot when you consider that in just two months during the pandemic the economy has shrunk by 25.07%. A look at Table 1 illustrates the wide-ranging effect of Covid-19 on the UK's economy. Apart from the agricultural sector, the negative impact is into double-figure.

Table 1. *Monthly Change in GDP Components Growth*

Components	February2020	March2020	April2020
Index of Services	0.0%	-6.2%	-19.0%
Index of Production	-0.1%	-4.2%	-20.3%
Manufacturing	0.3%	-4.6%	-24.3%
Construction	-2.1%	-5.9%	-40.1%
Agriculture	-0.1%	-0.2%	-5.5%

4.1. A Review of the UK Economic Policy Response during Covid-19

The impact of fiscal and monetary policies on the financial markets has been studied by many in recent years due to the global financial crises with varying results. As (Mishkin, 2009) hints, many have argued that conventional monetary policy does not work duringsignificant economic crises. However, the keyword here is conventional; according to (Blinder, 2010), a mixture of unconventional monetary policies do work in providing liquidity and thus reducing risks. During the Covid-19 pandemic, the Bank of England went with a combination of conventional and unconventional monetary policies. The Bank of England in

the role of regulator "advised" banks to forgo their dividends and bonuses policies during the Covid-19 pandemic. As reported by the Bank of England, there were several monetary policy responses to the Covid-19 economic impact:

- A reduction of the Bank Rate from 0.75% to 0.25%
- Maintaining the £435 billion quantitative easing policy
- Introducing a new funding scheme for small and medium-size firms thru commercial bank
- Cancellation of 2020 annual stress testing regulation to assist major market participants
- Postponing or adapting of several supervisory programs to enable financial institutions to focus on the implications of the Covid-19 pandemic

As highlighted by (Fakhry, 2018), at the heart of the argument on fiscal stimulus policies that have been raging for ages are two related issues: cost and impact. A key factor highlighted by the recent financial crisis is that the fiscalstimulus policies are costly. As (Tobin, 1971, p.91) states:

> "How is it possible that society can merely by the device of incurring debt to itself can deceive itself into believing that it is wealthier? Do not the additional taxes which are necessary to carry the interest charges reduce the value of other components of private wealth?"

Hence, a key argument is in the long run; the burden of debt is likely to be exceedingly high. However, as (Keynes, 1923, p.80) argues:

> "But this long run is a misleading guide to current affairs. In the long run we are all dead. Economists set themselves too easy, too useless a task if in tempestuous seasons they can only tell us that when the storm is long past the ocean is flat again."

Keynes was hinting that the benefits of the short-run impact of a stimulus policy far outweigh the costs in the long run, if the economy is in such a dire state. In a pandemic where the infectious rate is high, and no medical cure is available; the government had no options but to enact the health policies described earlier at a massive cost to the economy. According to the Centre for Regulatory Strategy at Deloitte[10], the response of Her Majesty's Treasury consisted of the following fiscal policies:

- Covid-19 Business Interruption Loan Scheme for small to large businesses
- Statutory sick pay (SSP) for SMEs (allow SMEs to reclaim SSP for Covid-19 affected employees)
- Covid-19 extension and enhancement for Time to Pay arrangements (allows UK businesses time and flexibility on taxes due)
- Support for businesses that pay little to no business rates
- Covid Corporate Financing Facility
- Grants for retail, hospitality and leisure businesses
- Covid-19 Job Retention Scheme (pays up to 80% to a maximum of £2,500 of employee salary furloughed due to Covid-19 policies)
- Rate reliefs for all property occupiers in the retail, leisure and hospitality business sector
- Deferral of income tax and VAT payments
- Self-employed income support
- Bounce back loan scheme

These government fiscal stimulus policies in conjunction with lower fiscal revenues will mean a significant impact on the deficit and inevitably debt of the UK's government. The elephant in the room is the upcoming economic impact of Brexit in the next few years.

[10]Source: [Retrieved from].

4.2. A Review of the Covid-19 Impact on Consumers

As advocated by (Leland, 1968) and (Sandmo, 1970) amongstmany others, the precautionary savings theory dictates that as uncertainty regarding income increases; the household reacts by increasing savings and decreasing consumption. However, there is an argument put forward by (Malley & Moutos, 1996), that precautionary saving is also dictated by unemployment, meaning any rise in the unemployment rate leads to an increase in savings. Moreover, a key factor to consider is the possible impact of a decrease in personal net wealth due to a loss in the value of investments or property. This decrease in personal wealth has the effect of raising loss aversion and hence further increasing precautionary savings.

As (Spilimbergo *et al.*, 2011) and (Aizenman & Noy, 2015) indicate, there was evidence of precautionary savings during the recent global financial crises. Further, as highlighted by (Li, 2020) and (Abay, Tafere & Woldemichael, 2020), the impact of the Covid-19 pandemic on the economy is partly due to the lockdown policies but also precautionary savings on the household side. Conversely, according to a weekly report by PriceWaterhouseCooper on the impact of Covid-19 on the UK's economy[11], there are three factors impacting consumers:

- Lockdown policy
- Increase in unemployment
- Increase in precautionary savings

[11] [Retrieved from]. on 4th June 2020

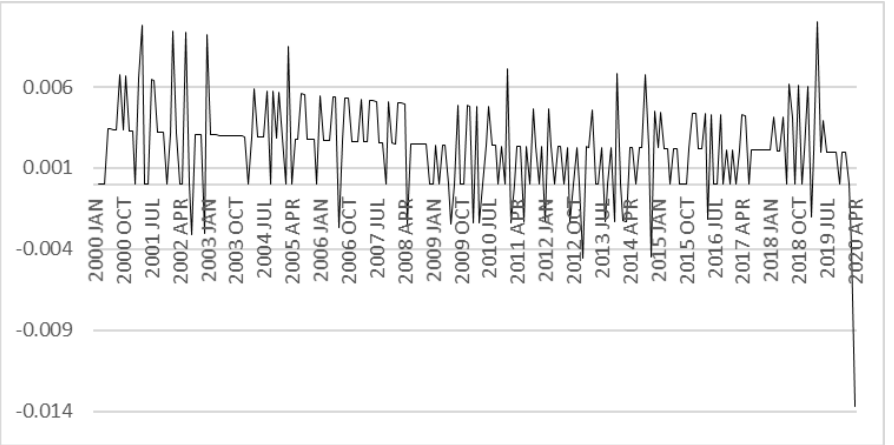

Figure 19. *UK Average Weekly Regular Earnings - Seasonally Adjusted*
Source: ONS.

According to (Keynes, 1936), consumption increases with disposable income, thus meaning that consumption also decreases with disposable income. However, as argued by (Friedman, 1957), consumption does not merely depend on current disposable income, consumers also account for expected future revenue. Additionally, as highlighted by (Friedman, 1957), consumption is not only determined by the current disposable income but also by other assets, such as: physical (property), financial (equity and bonds) and human (education and experience). Thus meaning, as (Arellano, Blundell & Bonhomme, 2017) and (Jappelli & Pistaferri, 2010), hints any income shock would impact consumption. Hence, as (Leland, 1968) and (Sandmo, 1970) argue, the precautionary saving theory dictates that during highly uncertain times where future income or wealth could be negatively affected, or unemployment is a rising factor; consumers tend to save more. Therefore, reducing their expenditure. As illustrated by Figure 19 and the next section, Covid-19 had a double negative impact of heightened income uncertainty and reduced financial assets values which affected the consumers' wealth

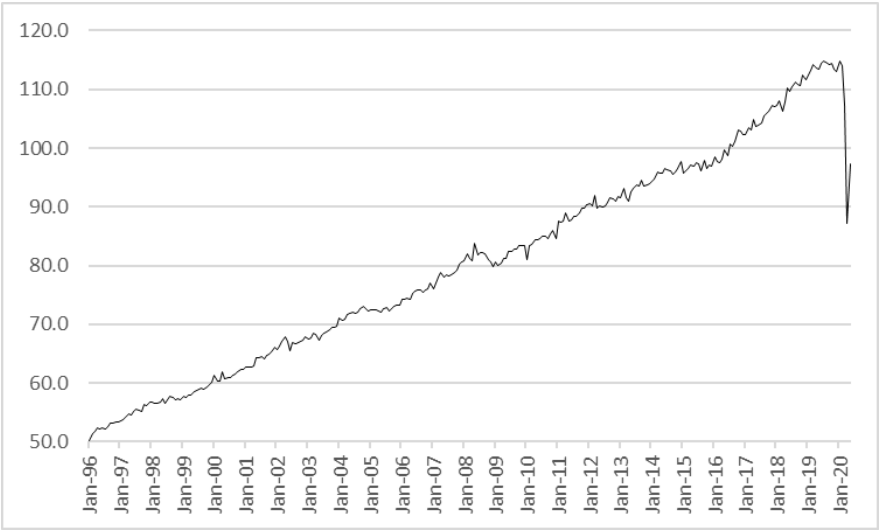

Figure 20. *UK Retail Sales Volume - Seasonally Adjusted*
Source: ONS.

The reduction in consumption due to the Covid-19 pandemic meant a decrease in retail sales. According to the ONS, retail sales fell from an index of 114.00 in February 2020 to 87.1 in April 2020, a reduction of 23.6%. Additionally, as illustrated by Figure 20, this reduction far greater and intense than any other since record began. The double impact of precautionary savings and the lockdown policy during the Covid-19 pandemic affected the retailers. And although there was an improvement in May 2020 as the effect began to ease, yet many businesses may go into administration over the next fewmonths; which may feedback into the precautionary savings theory. This feedback effect could trigger a downwards spiralwith the added impact of Brexit during the next few months.

Even without a second wave of the Covid-19, the global economic status is dire. The problem is that many organisations have suffered a massive impact on their financial situation during the lockdown. Therefore, many may not be able to operate as before the Covid-18 pandemic.

Moreover, many organisations may file for bankruptcy. This situation would have the effect of increasing unemployment; consequently, increasing the consumer income and wealth uncertainty and hiking the precautionary saving leading to a reduction in consumption. Therefore, leading to a vicious downwards economic spiral without accounting for the Brexit impact.

A review of the Covid-19 impact on the equity market

According to (Ramelli & Wagner, 2020), infectious diseases were ranked the tenth worst impact in the Global Risk Report by the World Economic Forum published on 15 January 2020 and were considered quite unlikely. Most investors were concerned with the traditional risk factors plus the environment. Yet, just a few months later, Covid-19 was characterised as a global pandemic and hence realisation of the severe worldwide economic consequences. Thus, highlighting the unexpected impact of the Covid-19 pandemic on the global financial markets. As highlighted by (Ramelli & Wagner, 2020), under a global pandemic with a high infectious rate; both policy responses and individual behaviours were unknown factors. Additionally, as hinted by (Ramelli & Wagner, 2020), the question is whether the combination of ongoing policy intervention and changing individual behaviour will stabilise the financial market or make it increasingly volatile. At the heart of this issue is the fact that market participants will be wary of any evidence of a resurgence in the Covid-19 pandemic.

Conversely, as argued by (Yarovaya, Matkovskyy & Jalan, 2020), the nature of the Covid-19 crisis is debatable. From a purely pandemic view, Covid-19 could be regarded as a black swan event; there has been no health event that had the same global impact on the economy and financial

markets. Moreover, (Baker *et al.*, 2020a) found that previous infectious disease outbreaks, even the Spanish Flu pandemic of 1918-1920, which killed an estimated 2% of the global population, had little impact on market volatility. However, the 1957 influenza pandemic, which killed between 1 and 2 million globally, did affect the US equity market with the Dow Jones registering a fall of 15% during the second half of 1957. Although, some of the impact of the 1957 influenza pandemic on the equity market may be attributed to other events. In sharp contrast to the effect of Covid-19 on the equity market; according to (Baker *et al.*, 2020a), the US equity market registered 22 Covid-19 related hikes in volatility between 24 February 2020 and 24 March 2020. Nevertheless, as argued by (Yarovaya, Matkovskyy & Jalan, 2020), from a crisis view, there have been many events which had triggered similar global effects on the economy and financial markets (e.g. 1929 Wall Street crash and 2008 financial crisis). However, as stated by (Baker *et al.*, 2020a), the Covid-19 surge in volatility is the third-highest on observation, higher than the great depression of the early 1930s and global financial crisis of the late 2000s. As hinted by (Baker *et al.*, 2020a), there are three main contributory factors:

- Severity and infectious of the Covid-19 pandemic
- News and information regarding Covid-19 pandemic is much more abundant and regular in comparison with the Spanish Flu pandemic
- The global economy is more interconnected than under previous global pandemics

According to (Ali, Alam & Rizvi, 2020). the changing impact on the global financial market is highlighted by the transformation from an epidemic to a pandemic. The spread of Covid-19 from China to the US via Europe meant an increasingly volatile global financial market. As hinted by (Ali, Alam & Rizvi, 2020), unlike China, the global markets

were increasingly conscious of the spread of Covid-19, and it's impact on the worldwide economy. Moreover, according to (Ashraf, 2020), the highly volatile global financial market owe just as much to international governments responses, both healthwise and economical, as to the Covid-19 announcements. However, the effect of Covid-19 announcements deviate with the type, the market perception to the number of deaths recorded is not as significant as the number of new cases. Moreover, this perception tends to vary with time andeconomic projection.

Additionally, as illustrated by (Zhang, Hu & Ji, 2020), Covid-19 had a strong influenced on equity markets. As suggested by (Zhang, Hu & Ji, 2020), long-term expectations cannot explain such a strong impact; it is almost sure that emotional factors played a critical role during the Covid-19 effect on the financial markets. The initial sentimental response by market participants to the global Covid-19 outbreak would generate an amplification effect thru social and news media which would cause extreme downwards pressures on the pricing of financial assets. The announcement on 11 March 2020 by the WHO, officially declaring Covid-19 as a pandemic had a significant impact on market participants behaviours and hence the global financial market.Furthermore, as stated by (Albulescu, 2020) and (Liu *et al.*, 2020), the relationship between the emotion of fear and the Covid-19 statistic announcements was the driving force in the global financial market. There is a positive correlation between the death ratio and the VIX. Additionally, an increase in the number of affected countries leads to a rise in financial volatility. Thus, hinting at fear being linked with the impact of the pandemic on an international level.

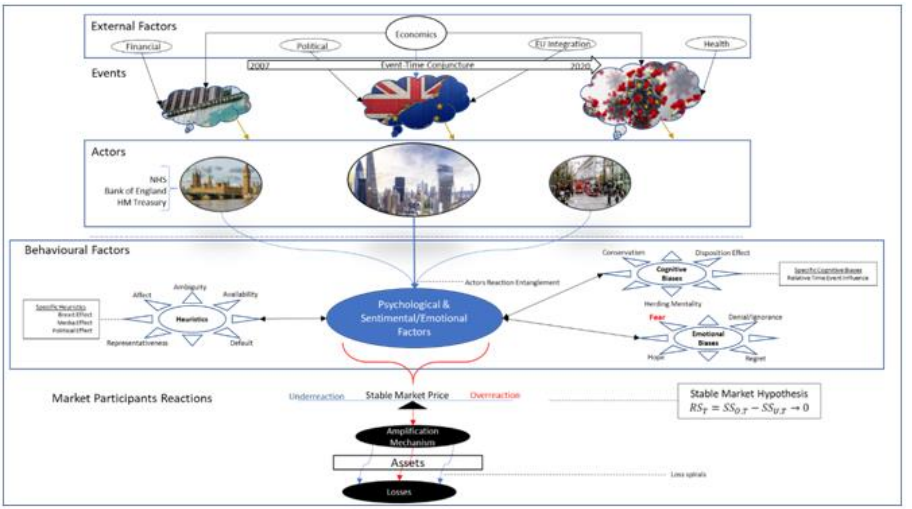

Figure 21. *The Covid-19 Uncertainty Behavioural Factor Model*

The general uncertainty behavioural factor modelcould be extended to demonstrate the Covid-19 pandemic effect on the UK's financial market, as illustrated by Figure 21 The impact of the actors and external factors have been discussed in the previous sections; hence in this section, we will concentrate on the behavioural factors influencing the market participants' reactions during the Covid-19 pandemic. Thus, as illustrated by Figure 21, the model dictates that the final two layers describe the behavioural factors and reactions of the market participants. As illuminated by Figure 21 in explaining the behavioural factors, we need to understand the heuristics and biases influencing the emotional and cognitive aspects of the decision-making process during the Covid-19 pandemic. Conversely, the influencing factor in the Covid-19 pandemic is the rarity of such an event, as (Yarovaya, Matkovskyy & Jalan, 2020) and (Baker *et al.*, 2020a) highlight, which makes rational decisions increasingly tricky. Hence, the need for heuristics to make investment decision.

A critical factor during the Covid-19 pandemic is the market participants perspective on losses and their reactions. Part of the explanation relies on the prospect theory of (Tversky & Kahneman, 1992). It is worth noting that the prospect theory dictates that market participants are more sensitive to losses than to gains of similar magnitudes. However, a significant behavioural effect influencing the prospect theory come into play during the Covid-19 pandemic crisis: certainty. During the Covid-19 pandemic crisis, it is plausible to assume that market participants tended to increasingly underweighuncertainty, hinting at disinvestment in assets effected by the pandemic crisis. As noted previously, the prospect theory relies on several fundamental behavioural traits which came into play during the Covid-19 pandemic crisis:

- Reference dependence

  It is safe to assume that many market participants used the price before the initial date of the pandemic as the reference price. So they evaluated their losses based on a pre-pandemic reference point; the argument is that the pandemic crisis changed the environment. Therefore, the reference point no longer existed. Assuming that many may have invested in a lower price than the reference point, thus they could have made a profit during the Covid-19 pandemic crisis. However, this would have been a loss in their eyes because of the reference point.
- Endowment effect

  Many market participants exhibited an illusion of control bias which meant they demanded more than they wanted to pay mainly due to the high reference point. During the Covid-19 pandemic crisis, the danger was that such behaviour would lead to losses.
- Loss Aversion

During the early parts of the Covid-19 pandemic, market participants were reacting to the number of countries infected by the virus, as stated by (Albulescu, 2020). As the pandemic spread globally, market participants became increasingly loss averse; hence, market prices began to fall.

Moreover, the policies enacted by global governments to slow down the spread of the virus meant that macroeconomics indicators and assets' fundamentals were weakened. This weakening doubled the impact on the financial markets leading to an increase in loss aversion. However, as Figure 21 and (Zhang, Hu & Ji, 2020) illustrates this increase in loss aversion led to the amplification mechanism, which simply dictates that when faced with losses on a holding position, market participants tend to sell the other assets in the hope that they could cover their losses. Thus leading to further losses and hence the loss spiral meaning financial assets which were unaffected by the Covid-19 crisis were now affected.

The Impacts of Cognitive Behavioural Factors during the Covid-19 Pandemic

It must be noted that heuristics are cognitive techniques used by many to simplify the daily workload. As hinted by Figure 21, there are several heuristics which could explain the behaviour of the market participants during the Covid-19 pandemic:

- Affect

  As we have maintained throughout, the Covid-19 pandemic had a psychological effect on many. Conversely, this effect was evidenced throughout the period; we suspect that many market participants may have been affected byemotional issues. Moreover, the impact of the affect heuristic could explain the irrational pricing of some equities

throughout the crisis. Hence, as hinted by (Albulescu, 2020) and (Zhang, Hu & Ji, 2020), the sentimental feelings towards the Covid-19 pandemic affected the pricing and volatility of the asset.

- Ambiguity

  As hinted by (Ramelli & Wagner, 2020), there were a lot of unknown factors influencing the global financial markets during the Covid-19 pandemic. Key among these unknown factors are:

  - The precise structure of the Severe Acute Respiratory Syndrom Coronavirus 2, making it challenging to be optimistic about a vaccine or drug to control it.
  - The true extent of the global infection rate
  - The impact of the Covid-19 pandemic on governmental policies and individual behaviours
  - The true extent of the impact of Covid-19 policies, such as lockdown, on the economy and organisations' finances

  Hence, market participants may have displayed ambiguity aversion during the pandemic. This display of ambiguity aversion was highlighted by the significant drop in share prices of many fundamentally strong companies in the early days of the impact. A critical factor to the continued market participant's behaviours is the ambiguity regarding the possible resurgence of the virus.

- Availability

  In the absence of any recent global pandemics, many people will rely on the memory of events which had a similar effect in comparison. The critical factor when it comes to pandemics is that many people remember seeing the deaths in past pandemics events such as the 2009 H1N1 pandemics; however, very few remember the actual facts.

Another crucial factor is that many will recall hearing about historical pandemics events such as the Spanish Flu of the late 1910s, a variant of the H1N1 virus, and more recently 1957 influenza, a variant of the H2N2 virus. These two factors would affect the perspective of the people view on the Covid-19 pandemic.

Moreover, another factor of note is that impact of recent uncertain events on the economy. The recent global financial crises had a significant effect on the worldwide economy; many people will tend to relate the economic impact of the global financial crisis to the Covid-19 pandemic. Furthermore, the prospective impact of the ongoing Brexit process, as highlighted earlier, will be fresh on the minds of many.

- Default

  Many market participants usually have two alternating defaults: during economics upturns where markets exhibit bullish conditions, the default setting is often set to buying risky high return assets. However, during economic downturns such as the Covid-19 pandemic, the default setting is usually set to selling risky assets in favour of safe-havens. During the Covid-19 pandemic, the mindset of the market participants may have been set to a negative default setting, which means that market participants were neglecting fundamentally strong assets in favour of safe-haven assets just because they were perceived as risky during these unprecedented times.

- Representativeness

  As stated previously, the elephant in the room was the potential impact of Brexit on the UK's economy. During the early parts of the Covid-19 pandemic, market participants were focused on the Brexit implications, disregarding the effects of the pandemic

on the economy and fundamental information. So it was not surprising that the pricing of financial assets followed the trend of the Brexit process rather than the pandemic. It was not until after Covid-19 was declared a pandemic by the WHO, and the UK's government was forced to take more stringent measures to slow down the infectious rate, that market participants began to consider the impact of the Covid-19 pandemic more seriously.

As pointed by Figure 21 we introduce three new heuristics to explain the reaction ofmarket participants during the Covid-19 pandemic.

- Political effect is the tendency for actions or inactions of policymakers to influence the decision-making process of the market participants.

The policy effect dictates the action or inaction of policymakers has the potential of hiking fear among market participants. As illustrated previously, during the early stages of the pandemic, the limited actions or practically inaction of the UK's government amounted to a "Keep Calm and Carry On" approach. This approach may have been the explanation for the behaviour ofmarket participants during the early stages of the pandemic. However, as the UK's government began to put into action policies that would stop the spread of the virus, the actions of the government heightened the fear levels. Mainly due to the impact of such policies on the economy. However, there is another factor in play; the dramatic government change of plan had the effect of inducing fears that the government got its policies badly wrong and may have underestimated the impact. Hence this factor may have raised the fear levels of the market participants.

Another critical factor is the Bank of England pressurising the banks to delay or stop the payments of dividends to shareholders, hence giving the impression that the banks may have capital issues during the pandemic. Moreover, it also reflects the idea that the Bank of England thinks the economy will be severely affected, given the "*advice*" that the banks should use the capital to help the economy. Thus, making market participants fearful of investing in assets with a strong affinity to the UK's economy.

A possible reactive impactoften associated with political association effect is many people tend to link different policies, e.g. economic, with distinct political parties. In term of this research, the critical link is the Conservatives party with Brexit and economic prudence and stringency. Both linkages were central to the Conservatives winning the last four general elections.

Hence, there is a strong argument for both linkages; yet as the Covid-19 pandemic has illustrated, there are no political associations when it comes to a significant economic crisis. However, Brexit had been the key policy for the Conservatives since the EU referendum of 2016. Hence, any u-turn or delay will signal a massive backlash from the population. Bearing this in mind, the market participants are pricing for a possible double impact of a second surge in the Covid-19 pandemic and the economic fallout from Brexit. This dual impact on the economy has the potential to lead to further austerity fiscal policy in the future since any Conservative government would want to preserve their economic integrity above all else.Given the association with economic prudence and the fact that the Conservatives have just recently being voted in with

a vast majority, market participants are likelypricing any future austerity fiscal policies into the price of the assets. Hence, essentially meaning that the political effect heuristic plays a significant role in the behaviour of market participants.

- Media Effect is the tendency to associate extreme events with TV programmes or films.

One possible explanation for the emotional and cognitive behaviour is the effect of past movies and TV programmes with epidemic/pandemic content. Over the years, it has been demonstrated that the content of media such as films or tv shows can influence behaviour. Many people link certain events to movies or tv programmes to help them "understand the facts".

Given that the Covid-19 pandemic is regarded as a Black Swan event; there is no real event that people, generally, andmarket participants, in particular, can easily relate to the Covid-19 pandemic. Therefore, a possible explanation is that many people were comparing the Covid-19 pandemic to a movie or TV show. Additionally, the media links to historical events such as the 1918 Spanish Fluand 1957 influenza pandemics would have affected many. The media effect heuristic may have translated into the initial impact on the global financial markets as Covid-19 was declared a pandemic. The reality would slowly replace the media effect heuristic as the information on the pandemic and governments reaction filtered into the markets.

- Brexit Effectis the tendency to concentrate on Britain's exit of the EU disregarding all other information or events.

Partly due to the affinity of Brexit in terms of the event-time conjuncture but mainly due to the amplified effect on all aspects of British lives,

economics and politics; Brexit has a significant impact on the decision making process of market participants. Brexit is the most significant change in the economics and political arenas since the UK originally joined the EU in 1973. The irony is that both these historic and momentous events involved the EU.

As highlighted earlier, the economic impact of Brexit is unknown with a range of -3% to -4% of GDP relative to staying in the EU, according to the latest statistics from (Hantzsche & Young, 2020). The potential economic impact of Brexit was the critical factor in the decision-making process during the early and later stages of the Covid-19 pandemic in the UK. The Covid-19 pandemic amplified the issues facing the UK's economy in both the short and long runs, which led to the market participants pricing the uncertainties and risks into the assets with the most affinity to the UK's economy. This double impact of Brexit and Covid-19 pandemic on the economy may have had a significant effect on the market participants view of some financial assets in the UK.

- Mutate

Generally, a bias is a disproportionate probability placed in favour or against an investment clouding the judgement of market participants. The cognitive bias limits the market participant's ability to deal with the information rationally. Figure 21 hints at market participants being critically affected byfourcognitive biases during the Covid-19 pandemic:

- Conservatism

To be fair, it could be said that during the early months of the Covid-19 pandemic most people, let alone market participants, were unaware of the

potential impact of the virus. It was not until the Covid-19 pandemic reached Europe in late February early March that most people began to pay attention to the pandemic. The 11 March 2020 WHO declaration promoting Covid-19 to pandemic status could be regarded as the critical moment in the awareness of the potential impact. However, the fact that the virus had already infected more than 80,000 globally and was spreading fast across the world by 29 February 2020 plus a vaccine was not likely for another 2 years, probably should have alerted the market participants of the potential impact. Furthermore, the evidence from China and many others in Asia of the economic effect of the Covid-19 pandemic should have also alerted the market participants of the economic crisis associated with the pandemic. Yet the FTSE 100 remained over 7,000 until 26 February 2020. This evidence seems to be pointing at market participants displaying conservatism behaviour in the pricing of assets. However, a possible explanation could be the reduction in uncertainty surrounding Brexit at the time, which could have stabilised the equity market.

An alternative view on the conservatism bias during the Covid-19 pandemic was the low price adjustments of shares with sound fundamentals. An influential factor underlining this view was the significant impact on the general economics of the country, as highlighted earlier. Like any other significant economic crisis, the Covid-19 pandemic could have created downward pressures on the company due to the general economic status, even though the company's fundamentals were sound.

- Disposition effect

As market participants became increasingly aware of the pandemic effect on the economy and hence financial markets, they became increasingly loss averse. During uncertain periods, such as the Covid-19 pandemic, it is common practice for market participants to sell winning shares too early and hold on to losing shares too long in the hope of maybe regaining their money. Another explanation is that the Covid-19 pandemic had a significant impact on the economy and financial positions of many companies, which had the effect of market participants assuming that most companies would be affected. This fear would get amplified to many financially healthy and winning shares.

- Herd mentality

  It must be noted that in the animal kingdom, an attack by a wolve or big cat would generate such a forward momentum that the herd don't know when to stop and fail to spot the cliff, hence fall to their death. In the absence of any real information and certainty on the impact of the Covid-19 pandemic, market participants were exhibiting this kind of herd mentality. They were seemingly so scared of the effect of the Covid-19 pandemic that they failed to spot the proverbial cliff and hence the prices of financial assets simply collapsed. This behaviour was confounded by the misinformation and inadequate actions of most national policymakers in the early stages of the pandemic. Furthermore, the economic impact of the Covid-19 pandemic in addition to the potential effect of Brexit was a drag on the equity market.

- Relative Time Event Influence bias is the tendency to let the most recent past event or information cloud a judgement.

The relative time event influence bias is an extension of the availability heuristic, which dictates that people rely heavily on events from memory. The relative time event influence bias contends that generally, people tend to remember and thus be influenced by the most recent events or information. The bias dictates that as time moves forward, the influence of the event or information slowly diminishes as another critical event or information replaces it.

The relative time event influence bias had a double impact on the market participants during the Covid-19 pandemic. Firstly, the most recent event was Brexit, which added more emphasis on the Brexit effect heuristic. Although the financial crisis had a more significant impact on the economy than the Brexit process, yet its influence on the decision-making process of the general public and more precisely on the market participants was waning. The issue is the potential impact of Brexit on the economy, which continues to play a significant role during the Covid-19 pandemic.

The second factor of importance is the role of information during the pandemic. Since the relative time event influence bias dictates that as time moves forwards, the influence of information diminishes as new information comes to light. Thus fast-moving details and policy reaction during the Covid-19 pandemic added to the uncertainty due to the quick turnover of information.

The Effects of Emotional Behavioural Factors during the Covid-19 Pandemic

It is difficult to analyze such an event from a purely cognitive perspective; when the Covid-19 pandemic was an

emotionally charged event. Hence, the affect heuristic may have influenced market participants during the pandemic, so there is a requirement to understand the emotional issues underpinning the decision-making process during this crisis. Contrasting with cognitive biases, emotional biases refer to the inability of market participants to separate emotions from investment decisions; thus effecting the market participant's ability to make rational decisions. As illustrated by Figure 22, the Covid-19 pandemic inversed the financial cycle of emotion, meaning emotions were on a downwards trends with the price after the initial impact. From the optimal Covid-19 break-line, 31st December 2019, the cycle of emotions was depressed, illustrating the effects of the Covid-19 pandemic on the global financial market. The problem was many, including governments, underestimated the severity of the pandemic and thus the global economic consequences. Moreover, it was only when the pandemic reached Europe that many market participants became aware of the seriousness of the Covid-19 induced crisis.

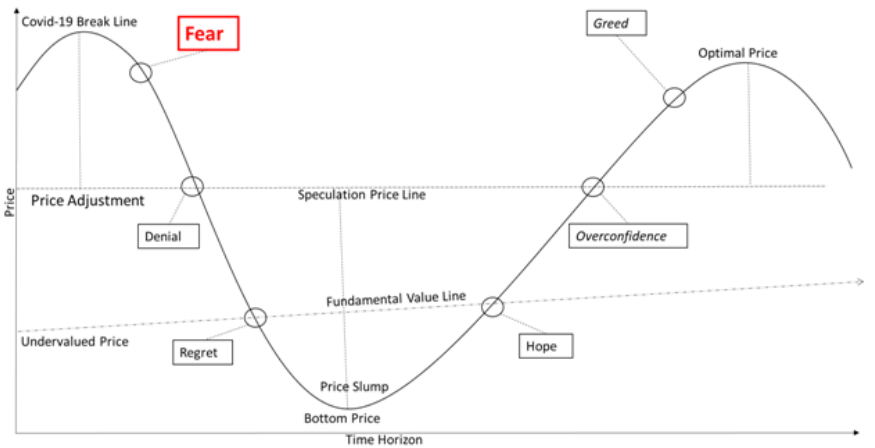

Figure 22. *The Covid-19 Financial Cycle of Emotions*

Conversely, the market participants were affected by sentimental issues as well as the fear that the pandemic

would affect their investments. Remember that generally, market participants do not act rationally when they cannot separate emotions from investment decisions. Furthermore, as maintained throughout, the impact of the pandemic on the global financial markets was confounded by the inadequacy of the governments' actions and mixed communications. Also, the lack of knowledge on the virus and global pandemic heightened the fear levels. Moreover, the impact on the economy from the health policies enacted to prevent the virus from spreading further was not truly known. These issues led to negative emotion behaviours by market participants in the aftermath of the pandemic, which are reflected in Figure 22 Critically, both the uncertainty behavioural factor model and the financial cycle of emotions as illustrated by Figure 21 and Figure 22 point to fear being the primarily emotional factor during the Covid-19 pandemic. However, we must not understate the role of the other emotions during the pandemic; thus, we will discuss all the emotional biases mentioned in Figure 21 and Figure 22:

- Fear

  According to (Albulescu, 2020) and (Liu *et al.*, 2020), the primarily emotional bias during the Covid-19 pandemic was fear and its related emotions. Therefore, although other emotions played a critical role in the behaviour of market participants during the pandemic, we will emphasise the role of fear.Fear is the one contiguous emotion that makes a person or group act irrationally, as so elegantly put by Bertrand Russell:

"Neither a man nor a crowd nor a nation can be trusted to act humanly or think sanely under the influence of fear."

In truth, this elegant quote by Bertrand Russell strikes at the heart of the influence fear had on all levels of society, including market participants, during the Covid-19 pandemic. A fundamental property of fear is like the virus; it is infectious. Therefore, once a group within society have it, it will spread to other groups.

During the Covid-19 pandemic, fear was initiated by members of the general population getting or knowing someone that has been infected. Another channel for fear amongst the general population is the media effect cognitive bias or the impact of the news. The UK was one of the last countries to be infected by the virus; however, the news of the impact the pandemic was having on other countries, especiallywithin Europe, did raise concerns amongst the general population. Moreover, the increased infections within the UK towards the middle of March had the impact of hiking the fear levels amongst the UK's population. As the government reacted to the pandemic, the fear spread to other issues; key amongst those issues was the economy and more specifically, the employment situation. As highlighted previously, the lockdown policy introduced by the government to control the virus infections, bought about an increase in job insecurity. It is a known fact that when people are faced with a heightened level of fear about their jobs, they tend to cut down on consumption. Consequently, leading to a feedback effect with the lack of expenditure hitting the organisations relying on the flow of cash, leading to an increase in job insecurity. Therefore, the pandemic had a double effect on the fear levels amongst the general population: economic and health.

Abraham Lincoln is quoted as saying:

"Democracy is the government of the people, by the people, for the people."

In short, the last two statements state any government must serve its people to the best of its ability based on the circumstances at the time or face being elected out. Therein lays the problem faced by many governments, the pandemic represented a catch-22 situation in that to limit the number of infections; governments had to turn to policies that would harm the economy. However, to prevent the pandemic from causing any severe damage to the economy, they needed to phase out the policies quickly. The fear for most governments during the Covid-19 pandemic was that both the health issue and economic indicators were dire.

As highlighted previously, the UK's government delayed taking action until 23 March 2020. A possible explanation was that the government feared a any early response would be seen by many as unnecessary given the lack of information. An additional reason is the damage the policy will do to the economy. Once the study by Imperial College London was published stating that containment policy would put enormous constraints on the NHS and result in 260,000 deaths, the government quickly changed its policy. The fear of a possible backlash from the public over the NHSand more importantly, the number of deaths, far outweighed the potential impact on the economy.

Conversely, the fear of the potential impact of the pandemic on the economy bought several fiscal stimulus policies to reduce the consequences of the

lockdown policy. These policies included multibillion pounds aids for companies to prevent mass unemployment. The problem is these government fiscal stimulus policies in conjunction with lower fiscal revenue will mean a significant impact on the deficit and inevitably debt of the UK's government. The white elephant in the room is the upcoming additional economic impact of Brexit in the next few years. So, it is essential for the UK's government that the policies of the Covid-19 pandemic do not overly harm the economy during a time of added uncertainties.

During the Covid-19 pandemic, fear and its related emotions were crucial attributes in understanding the behaviour of market participants. As hinted by (Albulescu, 2020), the fear levels rose in conjunction with the number of countries infected. Further, the assumption is that market participants were reacting with distance; thus meaning that the nearer the Covid-19 pandemic got to the UK, the higher the fear levels were. In essence, as hinted earlier, it was not until the pandemic reached Europe that most people began to take note; the change in the FTSE 100 trend reflected this upturn as we entered March 2020. The WHO's announcement on 11 March 2020 confirming the Covid-19 as a pandemic created a panic, the FTSE 100 loss 12.2% in the aftermath. Hence it could be characterised as a massive overreaction from the market participants, given that most people knew that Covid-19 was a pandemic by then. The key to understanding this panic is not in the upgrade to pandemic status, but the impact on the economy and financial status of organisations. The official status of the Covid-19 as a pandemic bought home the fear that most market participants had of a significant

adverse effect on the economy and hence the financial state of the publicly listed organisations. Moreover, the fear of subsequent waves of the virus is continuously being played out in the mind of investors which makes it even more challenging to stabilize the market. Another crucial factor in play is the impact of Brexit on the economy, especially since a deal has not yet been agreed, with the UK expected to formally leave the EU on 31 December 2020 in the mid of a possible second/third wave of the covid-19 pandemic.

- Denial or ignorance

  The difference between denial and ignorance is knowledge or information; whereas denial is the rejection, ignorance is the lack thereof. Therein lays the conundrum, was the Covid-19induced crisis the result of existing information or lack thereof on the virus and impact of a pandemic.The evidence from (Afelt, Frutos & Devaux, 2018) and (Bailey *et al*., 2018) seem to suggest that there were warnings of the potential impact of a new coronavirus pandemic. Moreover, many have criticised the government for the lack of actions and communication, as hinted by (Cowper, 2020) and (Hunter, 2020). Conversely, as implied by (Baker *et al*., 2020a) and (Anoushiravani *et al*., 2020), the Covid-19 pandemic was likely to have a significant impact on the economy. In truth, the evidence was there from the start as to the pandemic and its effects.

  Furthermore, the UK was one of the last countries to be infected by the virus. Hence, there was prior knowledge of the virus and its impact on society and the economy. Thus, leading to the accusation of market participants rejecting the existing knowledge

and living in denial. However, the truth may be a bit of ignorance and denial.

- Regret

  The emotion of regret is the sorrow of a result based on a decision taken in the past. The impact of the Covid-19 pandemic is based on the inaction of many on the information available at the time. As has been established previously, market participants were in denial or simply ignorance of the information on the Covid-19 pandemic and its economic effect. Thus to a certain extent, the losses were avoidable; this would lead to market participants regretting the rejection of the available information at the time.

  However, regret is a double-edged sword with the capacity to hit at a later stage in the crisis. Hence, many market participants would have regretted the decision not to take the opportunity to invest in fundamentally strong financial assets at the low price induced by the pandemic. In other words, some market participants may have regretted not heeding the information at the time. Still, others had regretted not taking the opportunity to invest when the price was low due to the pandemic

- Hope

  Every crisis reaches a point where market participants have raised hopes of the impact waning. During the Covid-19 pandemic, market participants raise hope due to the reduction in the number of new cases or countries infected. Another factor is the advancement of a new treatment which would help reduce the impact of the virus. With many competing organisations working on a possible cure, the likelihood is there have and will continue to be a lot of false down hopes. Conversely, the information does not imply these organisations are lying, but the

treatment is not as advanced as reported by the news or politicians. In most cases, the report of a drug or inject that contains the virus is just to state that a possible cure has been found; however, the actual treatment is at the initial stage of testing. For listed pharmacy organisations, the release of such information could have a positive impact on the share price.

There is another factor playing a role in the raising of hope during the Covid-19 pandemic; the impact on the country or organisation may not have been worst than first feared. So the market participants re-evaluate the effect, which raises their hopes. One critical factor to note, the hope displayed by the investors is temporary. Until there is a final cure which can be used; as will be illustrated later, the fear will always be of a potentially devastating subsequent waves, especially in the winter.

- Overconfident and Greed

  Generally, overconfident occurs following the realisation of the harboured hopes. During any crisis, the hope is to find a working solution for the influencing issue. Thus, the Covid-19 pandemic was always going to be about a successful anti-viral vaccine and a massive global reduction in the fatality/infection rates. The realisation of this hope would generate a boost in confidence that would, over time, merge into overconfident that the crisis is over. Hence, market participants would become increasingly risk-loving due to the confidence gained in overcoming the Covid-19 crisis.

  Moreover, this confidence would generate a view among some market participants that the markets have not changed. Thus, making market participants believe that they could achieve the optimal price

prior to the crisis. Therefore, many market participants would display the behaviour traits of greed. However, three critical factors are overlooked:

- In the aftermath of the Covid-19 pandemic, the world had changed. A generally pessimistic view of the future is held by many. Moreover, the Covid-19 pandemic had inevitably changed the behaviour of many. This behaviour change will be difficult to reverse. Hence, as we have alluded previously, the economy and financial market will be affected for an extended period. Thus, meaning that the optimal price of some financial assets will be much lower than before the pandemic. This factor was in play in the aftermath of the global financial crisis and to a lesser extent during the on-going Brexit process.
- As alluded by the WHO, the danger is many people will be overconfident that the pandemic is over when a successful vaccine is announced. On 3rd August 2020, the WHO warned "*there's no silver bullet at the moment, and there might never be*." Taking into account the fear that like many related epidemics and pandemics of the past, there may be several highly infectious waves. Also, as highlighted previously; the covid-19 pandemic may not be the last due to the permanent changes that have affected the relationship between man and animals.

Mainly due to these factors and the inevitable Brexit impact on the UK's economy and some organisations, this overconfident and following greed may be ill-placed.

The Reactions of Market Participants during the Covid-19 Pandemic

During the early stages of the Covid-19 pandemic, the reaction of market participants in the FTSE 100 was mixed. At the forefront of uncertainty was the impact of Brexit, a new Conservative government has just been elected with the promise of implementing Brexit deal or no deal. The markets were worried about a no-deal Brexit impacts on the economy. According to (Bevington *et al.*, 2019), relative to staying in the EU, the effect on GDP per capita is -3.5% for a no-deal Brexit with a WTO agreement. However, according to (Hantzsche, Kara & Young, 2018) and (Levell *et al.*, 2018), the impact could be as much as 3.7% or 3.3% respectively. Irrespective of the actual figure, the uncertain economic foundation presented a challenging backdrop for the market participants throughout the Covid-19 pandemic observed period.

As hinted by (Huo & Qiu, 2020) and (Phan & Narayan, 2020), there was an overreaction by market participants during the Covid-19 pandemic. It is common practice to assume that market participants overreact to any crisis and to a certain extent, this is true. However, the reactions depend on the stage of the crisis; during the early stages of the Covid-19 pandemic, as market participants' fear levels were increasing, there appeared to be a stake of denial or ignorance amongst the market participants. It is assumed that this stake led to market participants underreacting to the information surrounding the pandemic. As the Covid-19 pandemic reached Europe, market participants began to learn about the impact of the pandemic on the economy and hence the financial status of many listed organisations increasing the fear levels. Thus, when the announcements by the UK's government regarding the lockdown policy and the WHO confirming the pandemic status were made, the market participants fear levels were at heightened levels.

Therefore, ensuring a panic in the FTSE 100 as market participants overreacted to the combined impact of both these announcements. As hinted by (De Bondt, 2000), an overreaction is the disproportionate action to an event or information (fundamental or news) by the market participants causing a temporarily and dramatic deviation from the fundamental value. The fact that the market participants in the UK already knew that Covid-19 was a pandemic and that a lockdown policy with its impact on the economy was the only option available that would help avert a health disaster points to an overreaction to the announcements.

The Covid-19 pandemic crisis was a lesson in the amplification mechanism and its effect on the loss spiral. Figure 23 illustrates how the pandemic affected the entire UK equity market. By early March, the impact of the Covid-19 pandemic had reached Europe; thus, market participants were able to extrapolate the potential impact on the UK. However, market participants were in stale status due to the actions of the government as hinted earlier; therefore leading to an underreaction in the equity market. Furthermore, the market participants were in a state of denial or ignorance regarding the Covid-19 pandemic and its effect on the economy and financial market.

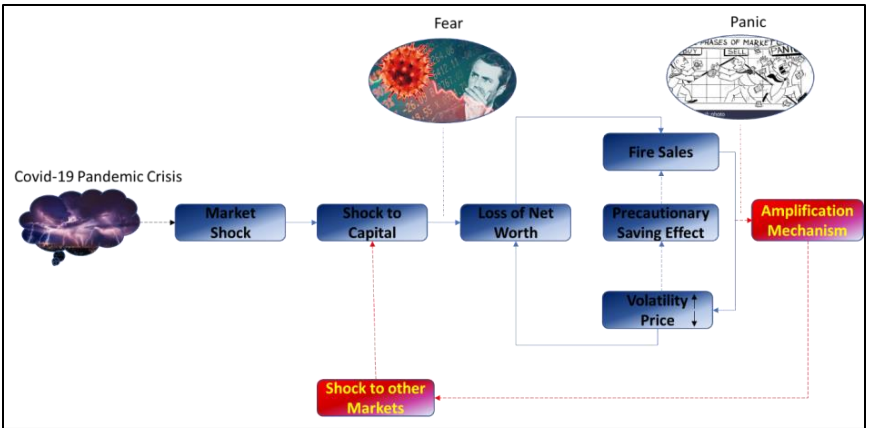

Figure 23. *Loss Spiral and Amplification Mechanism*

The change came as the government heeding the advice of a medical study by Imperial College London opted for an increasingly stringent policy to counter the impact of the virus. Thus, leading to an upturn in the fear levels as market participants reevaluated the effect of the pandemic on the economy and many listed companies balance sheets. Additionally, as highlighted earlier, the statements of the Bank of England impacted on the financial sector, and hence the economy increasing the fear levels still further. The market participants began to sell the financial stocks and the stocks with the highest affinity to the economy leading to the loss spiral as in Figure 23. The announcement by the WHO upgrading Covid-19 to pandemic status gave rise to a panic and thus, as illustrated by Figure 23, the amplification mechanism with the overreactions of market participants spilling over to other more secure assets. As highlighted previously, the critical factor was that many market participants knew the impact from other European countries on the economy and financial markets already. Moreover, the pandemic status of Covid-19 was a giving. Yet the market participants panicked pointing to an overreaction to

the information and events during the later stages of the Covid-19 pandemic crisis.

The panic led to a loss spiral and amplification mechanism; the amplification mechanism dictates that during the Covid-19 pandemic, market participants already fearful of the impact on the economy from the evidence of the other European states were selling their perceived risky assets. The announcements by the Bank of England in mid-March only initiated the amplification mechanism, which gave rise to the loss spiral extending to the financial sector. The UK's government announcements of changes in policies to increasingly stringent policies to tackle the spread of the virus further exaggerated the amplification mechanism which spread to the risky assets with direct affiliation to the economy, e. g. the retail sector or travel sector. The upgrading of Covid-19 to pandemic status by the WHO compounded the amplification mechanism and led to the final panic, which exaggerated the loss spiral.

As noted by (Barberis, 2013a), an added complication is the effect of the loss and ambiguity aversions on the amplification mechanism and inevitably the loss spiral. Part of the explanation is the competence hypothesis of (Heath & Tversky, 1991). The competence hypothesis dictates that the level of competence at analysing the situation determines whether the person is ambiguity averse or seeking. The premise maintains that the initial economic indicators during the Covid-19 pandemic made the market participants less competent in analysing the risk presented by the pandemic. Thereby increasing the ambiguity aversion of the market participants, leading to a reduction in their holding of risky assets, therefore further reducing the price of these assets.

The other explanation relies on the loss aversion role, according to (Kahneman & Tversky, 1979), this observes that the initial evidence of the implications of the Covid-19 pandemic on the economy made market participants

increasingly loss avert leading to the selling of risky assets associated with the UK's economy. The announcements by the UK's government of increasingly stringent policies push up the loss aversion, therefore selling more risky investments. The final straw which broke the camel's back was the WHO's Covid-19 updated status, which led to the panic. Both the ambiguity and loss aversions emphasized the amplification mechanism.

Figure 24. *FTSE 100 Daily Price*

Conversely, as hinted by (Albulescu, 2020), the fear levels increased with the number of countries infected. Key to the illustration of the fear levels in the market are the price and volatility. A look at Figure 24 and Figure 25 illustrates the impact of fear; since 1984, there have been six events exhibiting fear behaviour. However, Figure 25 points to the announcement by the WHO on 11 March 2020 promoting Covid-19 to pandemic status as the highest volatility level. Moreover, Figure 26 illustrates the loss recorded on the day of these fear events; the Covid-19 announcement marked the worst one-day loss over the entire observation. We assume that any loss over 10% is a panic, hence giving our assumption there were only three one-day panics over the whole observation, with two being associated with a single

event, Black Monday, on 19 and 20 October 1987. Although, as stated by Figure 25, the 2007/2008 global financial crisis did register a significant hike in volatility. However, based on our assumption, there was no one-day panics during the global financial crisis.

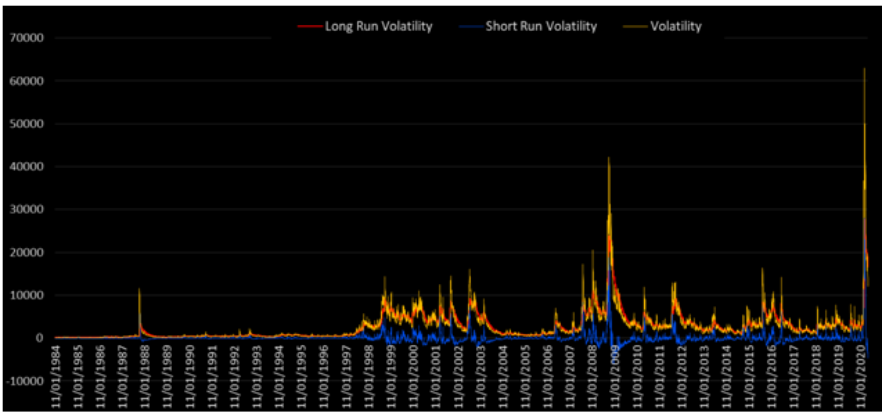

Figure 25. *FTSE 100 Price Volatility (Estimated using Component GARCH)*

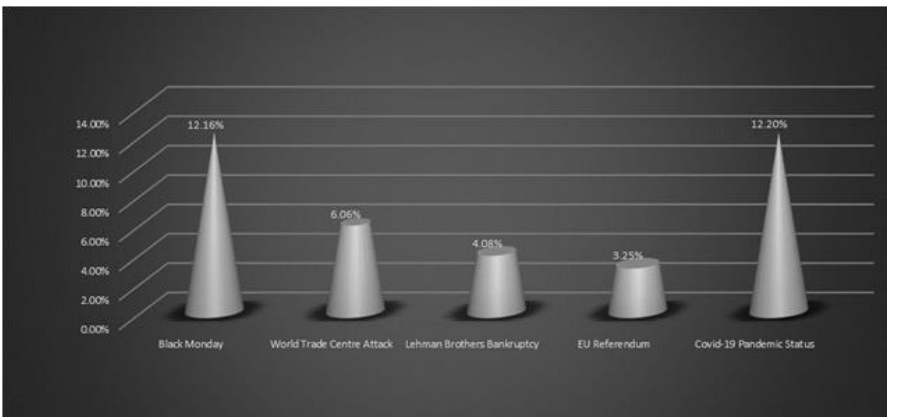

Figure 26. *Major FTSE 100 EventDaily Loss*

The six-month observation of each crisis illustrates the continuation of the fear in the aftermath of the event. As explained by Table 2, except for the Lehman Brothers

bankruptcy during the global financial crisis and the initial announcement of the virus by the WHO; the crises hit the low point within the first two months. However, both the initial Covid-19 announcement and Lehman Brothers bankruptcy had long-run uncertainties; moreover, both were, to a certain extent, black swan events. Furthermore, both events had unforeseen effects on the economy. Conversely, the Covid-19 pandemic had the worst impact on the FTSE 100. Remember, we assume that any loss of over 10% could be regarded as a panic. Except for the EU referendum result, all the events had been effected by considerable panic runs. So, another explanation is that there were unforeseen factors which had the impact of extending the panic run. During the Covid-19 pandemic, there were unknown factors such as the impact on the economy which may have extended the panic rum, remember it was not until the pandemic reached Europe that most people appreciated the effect on the health and economy.

Table 2. *Major FTSE 100 Crises 6-month Period Worst Loss*

Crisis	Black Monday	Russian Default	World Trade Centre Attack	Leman Brothers Bankruptcy	EU Referendum Result	Initial Covid-19 Announcement
Start date	19/10/1987	17/08/1998	11/09/2001	15/09/2008	24/06/2016	31/1/2/2019
Low point	09/11/1987	05/10/1998	21/09/2001	03/03/2009	27//06/2016	23/03/2020
Loss	32.00%	14.97%	11.92%	32.51%	5.62%	33.79%

The review of the FTSE 100 underlines the importance of understanding the market participants' reactions during the Covid-19 pandemic. During the early stages of the pandemic, the reaction was rather mute; this was possibly due to a combination of factors described earlier in this section:

- Ambiguity effect
- Representativeness effect

- Political effect
- Brexit effect

In truth, these factors highlight the significant lack of information regarding the Covid-19 pandemic and its effect on the economy and financial market. Moreover, they point to the impact of Brexit on the financial market in the early stages of the pandemic.

Conclusion

In this paper, we introduced a new model of uncertainty behavioural factors to highlight the primary behavioural and external factors influencing any uncertain event. Moreover, the model is a graphical top to bottom illustration of the behavioural factors during an uncertain event. The aim is to provide a top-level view of the external factors, events, actors, cognitive and emotional behaviour factors, and market participants' reactions influencing the uncertainty. We briefly highlighted the key general factors influencing the decision-making process of the market participants during any uncertain event.

Crucially, we used the model to illustrate the Covid-19 pandemic impact on the behaviour of market participants in the FTSE 100 equity market. The effect from the pandemic came from the uncertainty surrounding the virus and implemented policies effects on the economy and balance sheets of publicly listed organisations. Not surprisingly, the lack of actions and mixed communications by the government led to the UK being the worst hit in Europe by the pandemic. The belated actions meant that the total number of deaths and infected cases are 46,526 and 312,289 as of 12th August 2020. However, the economic impact is -18.2% and -20.4% during the first two quarters of 2020 as reported by the ONS on 12th August 2020. So, the essence of the market participants' fear is correct; however, given that most market participants were already anticipating the

worst impact and knew that covid-19 was a pandemic, their actions could be characterized as an overreaction. What did not help was the communication and policies mixed up not only by the UK's government but also by the Bank of England during the early stages of the pandemic impact in the UK. The fear levels remain high due to anticipated further waves of the pandemic added to the effect of a no-deal Brexit on the economy in the next few years.

The model was successful in highlighting the factors and actors as well as the cognitive and emotional behaviours influencing market participants' decisions during the Covid-19 pandemic crisis. We extended the model of heuristics and biases to enable us to explain better the behaviour of market participants during the Covid-19 pandemic. Moreover, the model does present a simple graphical top-level overview of the Covid-19 pandemic crisis. Furthermore, the model did explain the pandemic and highlighted the influence of the Brexit process. Finally, we are sure it could be extended to model any crisis.

The concluding remark is that policymakers should not restrict their policies on the advice of a single group, especially in the adverse environment of apandemic or any other major crisis. Policymakers shouldthink before acting or communicating because the action may be right but could be conceived the wrong way.

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3 The march towards poverty: Why the labour government has much more to deal with than the economic consequences of Covid-19 in its upcoming budget

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Introduction

It's time we faced an unpalatable truth: New Zealand is going backwards, falling behind the vast majority of our OECD partners in virtually every social and economic measure that matters. Even now, the challenge of turning things around, and returning to a place where we can

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guarantee the future prosperity of our younger generations, is daunting. If we stay our current course, burying our heads in the sand and pretending that everything is all right, then that challenge will soon become insurmountable.

For this reason, Thursday's budget is perhaps the most important in New Zealand's history. In the aftermath of the economic fall-out caused by the Covid-19 outbreak, the Labour Government must not only seek to help those who have been most affected by the recent lockdown, but also introduce the framework for radical new policies; policies which address the systemic weaknesses that have undermined our economy and society for so long, and which threaten our very future.

In these extraordinary times, the upcoming budget amounts to a singular opportunity, and a real test of leadership. The Government holds New Zealand's future in its hands. It has the chance to own up to our collective failings, hit the reset button, and provide for a prosperous future that advantages all New Zealanders.

Where we stand

When assessing the overall health of a country's society and economy, there are a variety of measures that should be taken into account. They include an assessment of:

- How well a country is handling the three cornerstones of social wellbeing - social welfare, education, and health.
- Its housing stock and the housing market.
- The level of tax burden that falls on individuals and corporations.
- Debt levels and their sustainability.
- Productivity.

In every single area, New Zealand lags behind countries against which it has traditionally measured itself. To catch up, bold thinking will be required, overhauling outmoded

policy and institutional frameworks that have diminishing relevance in our modern world and which are inexorably leading us towards comparable poverty. Above all else, there has been a level of complacency and unwillingness to engage with ideas that challenge the prevailing norms. This conservatism has put us on the road towards poverty and threatens to jeopardise the social well-being of all New Zealanders.

The good news is that it's not too late to change. An overhaul is still possible – and the authors have a template for change that they would like to add to the debate – but that is for another paper. Right now, we are facing a more pressing issue. It is this. To begin the process of fixing something that is broken, we must first own up to it being broken in the first place.

New Zealand is broken. The rest of this paper explains how this has come to pass, and the scale of the task facing us, if we are to right the ship.

The emperor has no clothes

The New Zealand economy is like the man swimming naked in the ocean, blissfully unaware that the tide is going out. Everything is fine until the water recedes to a point where he is left exposed.

Right now, the tide is retreating rapidly, pulled by the economic aftershocks of Covid-19 and the gravitational weight that comes from decades of policy inertia. Across almost every area of social and economic policy that matters, New Zealand is not simply in danger of being exposed, it is standing naked in the shallows.

3.1. The three pillars of social wellbeing

For the last 80 years, the State has provided for education, health and social welfare in New Zealand, with each successive government, whether Labour or National,

increasing its year-on-year spend in all three areas. In real terms, we have increased annual spending on these items from $4,500 per person in 1972 to over $12,000 today (NZD 2019).

Put another way, 71 cents in every dollar of Core Crown Expenditure is now spent on education, health and social welfare. Given this, you would expect the outcomes, in terms of productivity and performance, to have improved considerably across all three sectors. Instead, the opposite is true. Our education standards have fallen in comparison to our OECD partners; costs and queues have risen in the health sector (and things will only get worse as our population ages); and our social welfare system is broken, not only the focal point of rising community anger and resentment, but so impoverished that it is putting the most vulnerable at risk.

3.1.1. Education

After 80 years of state-provided, free education and billions of dollars of investment, New Zealand might reasonably be expected to have a flourishing education system, with our attainment levels across all three major educational disciplines – literacy, mathematics, and science – amongst the best in the world. Sadly, this is not the case.

- In 2018, the Book Council announced its findings that 40% of Kiwi adults could not read at a day-to-day functioning level. Clearly, this is a troubling statistic, and – sadly - it is not one that we look like fixing in the near future. In 2017, the 'Progress in International Reading Literacy Study' found that New Zealand was one of only 12 nations where reading ability has fallen. This test, which recorded reading benchmarks for 10 yearolds across 50 countries, showed about 27% of New Zealand children did not meet the relatively low, "intermediate benchmark", for reading, compared to an international median figure of 18%.

- In 2015, 16% of all Year 5 pupils in New Zealand sat below the international benchmark for numeracy. Whilst this might not seem a bad result, at first blush, what this means is that 16% of our students were unable to add or subtract whole numbers, were unable to understand multiplication by single digit numbers, or how to read simple bar graphs and tables. By comparison, the international average was 7%.
- In 2015, 12% of all New Zealand students failed to meet the similarly low benchmark in science, compared to 5% internationally.

On the basis of these figures, it is impossible to escape the conclusion that education, in its current form, is failing many of our children and particularly our most vulnerable. If we are to catch up with the rest of the advanced world, we need to approach the problem differently than we have done.

3.1.2. Health

In 2019, we spent almost twice as much in real terms on healthcare as we did in 2001 (the spend having increased from around 9.5 billion in 2001 to in excess of 18 billion today – in 2019 dollars). Despite this increase in costs:

- At a primary healthcare level, there has been a decline in the number of consultations taken in New Zealand, per head of population.
- One in three New Zealanders over the age of 15 have one or more unmet needs from primary healthcare in the last year.
- Almost every single District Health Board in New Zealand is in debt, with their spending far outstripping their income (and, it might be added, using their allocated resources poorly, with around 33 cents in every dollar lost to institutional inefficiencies).
- Significant inequalities remain in terms of access to, and the provision of, healthcare, with Māori, Pacific

peoples, disabled people, and people experiencing poverty, particularly disadvantaged.

When we add our aging population into the mix, and the enormous extra burden that will be imposed on our health-care system in the decades to come, it is hard to disagree with the Ministry of Health's own finding, in its 2016 strategy report, that the current services provided by the government are unsustainable in the long run and that "it is essential we find new and sustainable ways to deliver services."

3.1.3. Social welfare

The government currently spends around 9.7% of GDP on social welfare (including superannuation), well in excess of any other item, and almost as much as we spend on health and education combined. Whilst it does so for good reason - to alleviate poverty and material hardship for New Zealanders – our social welfare system is failing.

Despite a drastic increase in funding per beneficiary over 80 years of government, there are still large amounts of material hardship in New Zealand. In June 2019, 13.4% of all our children lived in a household experiencing material hardship, whilst the recent report published by the Welfare Expert Advisory Group (who were appointed by the current Labour Government), makes for harrowing reading. It notes that that the payments available to families who are reliant on benefits falls well short of "those levels of income necessary for an adequate standard of living, let alone the levels necessary for even modest participation in society."

The report further notes that "our current system was set up in a different time and no longer meets the needs of those it was designed to support", that it is "unmanageably complex", "infantilizing", "puts vulnerable people at the whim of politicians", and that it " diminishes trust, causes anger and resentment and contributes to toxic levels of stress."

Clearly, the current system requires more thought if we are to create a welfare system that provides beneficiaries with the requisite levels of dignity and opportunity. It is difficult, though, to see where the money will come from, if the government continues to fund the sector under its current model.

In no small part, this is due to the looming crisis associated with superannuation: namely, the enormous costs that New Zealand will face in the coming decades, as it meets its commitments to an aging population.

In 1970, the median age of New Zealand was around 26 years old. In 2016, it had increased to 37, and is projected to increase to around 40 by the early 2030s, and to 46 by 2068. More troubling, the ratio between those who are of working age (15-64 years old) and those aged 65 and over, is dropping precipitously. In the mid-1960s this ratio was 7.1. It had dropped to 4.4 by 2016 and – under current modeling – will stand at 2.8 in the mid-2030s and 2.0 in 2068. In other words, by 2068, there will only be two working age New Zealanders to every superannuitant.

How can such a small working population, relatively speaking, possibly care for itself, at the same time as meeting the requirements imposed by our current social welfare policies; requirements which depend on New Zealand's workers to cover the costs of caring for beneficiaries and those aged over 65? For too long, our governments have turned a blind eye to the coming tsunami, putting the problem of an aging population off for another day (and for another government to deal with).

We can no longer afford to do so. This is particularly clear when you also factor in the health costs of caring for an aging population. In New Zealand, by 2025, 50% of all Government spending on healthcare will be spent on those aged 65 and over (despite the elderly making up only 15% of the population). This is consistent with OECD statistics

which indicate that, on average, those over 65 account for 40 to 50% of health spending and, per capita, have healthcare costs 3 to 5 times that of those under 65.

By not saving now for future healthcare costs and superannuation, and instead relying on future taxpayers to cover them, out of general tax revenue, we are playing a very dangerous game; one that puts the social well-being of New Zealand's most vulnerable citizens at the mercy of political whims. We are not simply hoping that our future generations will be able to meet the costs of these payments, but that they will be willing to prioritise such spending over all other meritorious (and unmeritorious) demands for spending. If nothing changes, New Zealand will need to raise taxes significantly or borrow enormous amounts of money, simply to keep our health-care and superannuation programmes afloat.

The current social welfare model is broken. New methods of thinking are required to protect recipients, ensuring that:

- Beneficiaries are afforded a decent standard of living (including the opportunity to play a full role in society);
- Child poverty is eradicated;
- All New Zealanders have the opportunity to enjoy a comfortable retirement, with sufficient capital to earn a substantial income, no matter what their jobs have been in their working lives.

3.2. Tax

The age-old response of governments to crises like the ones outlined above, has been to increase the tax burden. This is no longer an option, for the following reasons:

- The economic consequence of the Covid-19 shutdown, unfolding as we write this paper, could be as great as the Great Depression. It has caused economic

devastation; to individuals, their families, and their businesses. At the moment, they simply cannot afford the costs of higher taxes. For the medium term at least, tax rates will need to stay where they are, and arguably (in the case of low income workers and small businesses), should even be reduced.

- New Zealand's tax burden is already amongst the highest in the world. Whilst this might come as a surprise to those who are encouraged by our politicians to simply compare our headline personal tax rates with those of our OECD partners, the truth is that our proportion of income tax and company tax to GDP is high, as is our proportion of GST revenue to GDP. In a recent study using the Heritage Foundation's Economic Freedom Index, New Zealand economist, Bryce Wilkinson, found that in 2018, individuals living in 135 out of 180 countries had a lower tax average than New Zealand. By count of population, that amounted to 94% of the world's population living in a lower tax environment than we do!
- History tells us that when governments create a high tax environment, they unwittingly provide an incentive for those who can afford it to hire smart accountants to find innovative ways to lower their tax. In other words, high taxes will often result in a reduction in tax revenues. The lessons of 1988 are salutary here. When the Labour Government of the time reduced the top tax rate (for those earning $60,000+), from 66% to 48%, and then to 33%, the number of New Zealanders declaring income over $60,000 rose six-fold, with a revenue increase from $876 million to $2,544 million (1993 dollars).

Ultimately, there is a tipping point where increases in taxes actually cause a decrease in revenue. From the evidence, New Zealand may have already reached that point, meaning that raising taxes – either now or in the

foreseeable future – will not be the panacea many statists would have us believe. Rather than helping us pay our way out of trouble, such a move would almost certainly have a detrimental effect, both from an economic and societal standpoint.

And besides, the simple truth is this: *we already have enough money in the system to provide world-class services*; it's just that the money is being poorly used, captured by the very institutions that are meant to help, rather than being passed through to the pupil, the patient, or the consumer, in a way that makes a material difference to their lives.

3.3. Housing

A few decades ago, most New Zealanders regarded home ownership almost as an implicit right; a cornerstone of our egalitarian tradition and a safe harbor to store and accumulate wealth.

How times have changed. In the last 20 years, house prices have quadrupled, with low housing stocks, an overly complex policy environment, land banking, and the intransigence of privileged landowners, all contributing to a situation that not only undermines the opportunity for New Zealanders to own their own home, but our entire social fabric.

When we look at the issue of housing, we see the following problems:

- Our house prices are too high. All of us understand this instinctively, but by applying the 'median multiple' method which Demographia International uses to conduct an annual survey of housing affordability, we can truly see how difficult it has become to own a home in New Zealand. The 'median multiple' measures house prices divided by median household income to compare cities and countries around the world (i.e., how many years annual income does it take to buy a house?).

Demographia considers that if the median multiple is less than 3, house prices are generally considered affordable. At the other end of the scale, if the multiple is more than 5.1, then they consider house prices to be severely unaffordable. In 2019, the most affordable housing markets were to be found in the US, with a 'moderately unaffordable' multiple of 3.9, followed by those in Canada at 4.4, the UK at 4.6 and Ireland at 4.7. In comparison, Australia's measured cities had a multiple of 6.9, whilst Auckland – *with a staggering multiple of 8.6* – was considered severely unaffordable.

- When house prices increase, it has a disproportionate impact on low income New Zealanders, not simply because they have no hope of purchasing their own home, but because rent prices increase too. Inevitably, high rents take up a greater portion of disposable income for low-income earners. In 2016, housing costs typically consumed 20% of income of a working-age household, as compared to 14% in the mid-1980s. But if you sat in the poorest fifth of New Zealand in terms of income over that period, housing costs rose from 29% to 49%. Such an increase cannot come without a commensurate increase in material hardship for many New Zealanders. If we want to find a reason why 13% of our children live in poverty or near poverty, then rent and mortgage costs are a good place to start.
- High house prices also affect investment in New Zealand. Because high prices consume savings, there is less left over to invest in productive industries.
- The demand for houses has far outstripped supply. A report prepared for the New Zealand Initiative by Michael Bassett and Luke Malpass found that New Zealand's new house building is lagging, with a shortfall of at least 10,000 new houses annually, whilst the New Zealand Productivity Commission's enquiry into housing

affordability found that New Zealand, in comparison to most of its OECD partners, has been slow (and about half as effective) in its responsiveness to changes in housing demands. Of course, this is not because we suffer from a paucity of land in New Zealand upon which to build. Rather, the shortage is an artificial one, with limits imposed by Local Councils, Central Government and/or private developers all working to maximize returns from land banking, at the expense of affordable land and housing.

- When you add the complex set of rules and regulations that New Zealand operates under, then matters become worse. Of particular concern is the system we've created that protects privileged landowners at the expense of those most in need, with existing homeowners having broad rights to object to any change to their neighbourhoods. Inevitably, such rights lead to a reduction (or, in many cases, the elimination) of any new construction in an area, locking people out of the housing market or relegating them to distant suburbs, so that our society becomes increasingly stratified geographically. When you consider that affluent suburbs typically have better public services available, including schools, libraries, transportation, and other amenities, then this issue might be seen as lying at the root of New Zealand's pervasive social inequality, with ramifications beyond the simple fact that many low-income families are forced to live a considerable distance from the city.
- Finally, too much of our limited housing stock is of poor quality. As the Productivity Commission has noted, the poor condition of New Zealand's housing stock has been linked to poor health outcomes, particularly our unprecedented high levels of rheumatic fever. It is a tragedy that such outcomes are seen most prevalently amongst Māori and Pacific peoples.

New Zealand's housing market is in a state of disarray. If we are to return to the days where everyone who wants to purchase their own home, can afford to (and there's no reason why this shouldn't be possible), then existing privileges, regulations, and land banking will all need to be ended, replaced instead by a more equitable – and efficient – policy framework for housing.

3.4. Productivity

There is only one way to continually and sustainably increase the living standards of all New Zealanders over time and that is to lift productivity in New Zealand.

Productivity is a measure of certain outputs to inputs. When we make more or better goods and services for the same or fewer inputs (i.e., the time and/or resources we put in to producing a good or service), our productivity improves. It is not about working longer hours, or even working harder, productivity is about getting more from the effort or resources we put in.

Unfortunately, there is something baked deep within the structure of New Zealand's policy environment that has seen long-term, low, and declining productivity growth rates, across labour, capital, and multi-factor productivity measures. From 1960 to 1984, New Zealand had the slowest rate of productivity growth in the OECD, and not much has changed since. By international comparison, our labour productivity remains 40% below the top half of the OECD, the net result of which is below average incomes in New Zealand.

In a recent comparison of OECD countries, New Zealand economist Michael Reddell notes that New Zealand ranks 4th last for labour productivity growth and "simply last" for multi-factor productivity growth. Moreover, for the most recent 5 year period measured, New Zealand averages about

65% of the GDP per hour worked of the median country for which the OECD as data.

Given that GDP per hour is a fairly reliable indicator of the prospects of a country in the long term, we are quite clearly running a long way behind our competitors, and losing ground fast.

Whilst there are a number of reasons for this, including the high off-the-shelf costs of capital goods in New Zealand, the small size of our domestic market, and our low investment in knowledge-based capital, productivity within government sectors is also to blame. These services, which include education and health, amount to close to a fifth of the economy and their abysmal productivity levels contribute to our poor performance. For example, between 1996 and 2018, labour productivity for New Zealand averaged 1.4% per year (the OECD average was over 2%), compared to labour productivity for the health sector, which averaged 0.8%, and the education sector, which averaged negative 1.4%.

An increase in the rate of productivity growth per year will deliver New Zealanders the real increase in wages they so desperately need. We should not lose hope that this is possible. If we are willing to to bring this issue out into the open, keep a laser focus on improving outcomes and put in place quality policies (including the reforms supported by the authors in their upcoming paper), we can transform New Zealand into a high wage, wealthy economy.

3.5. Debt

Recent New Zealand Prime Ministers, and their Finance Ministers, have made much of our debt levels, trumpeting them not only as historically low, but also as positioning us for a rosy economic future. Putting aside the fact that much of this debt reduction happened as a result of policies instigated in the 1980s and 1990s, and that our true debt

levels are scandalously under-represented (more on this later), this rhetoric is about to change.

Covid-19, and the economic devastation it has wrought, has not simply shifted the goalposts, it has set everything up on an entirely new playing field. In its wake, the costs of keeping the New Zealand economy on its feet, let alone managing a recovery, will run into tens of billions, perhaps even hundreds of billions, of dollars. Already, Finance Minister Grant Robertson has warned that New Zealand will be running deficits for an extended period of time and that debt levels will reach an "all-time high". Whilst details about what this means in concrete terms are sorely lacking, one can't help but imagine that the news isn't good for the young generation of Kiwis who will be saddled with the costs of repaying this debt.

When we add to this the tens of billions of dollars we lose every year, as a result of the government's studied reluctance to tackle the twin problems of privilege and waste, it is clear that the issue of national debt will soon become part of our day to day lives.

Unfortunately, it is not simply our Covid-related debt that we must seek to manage in the medium to long term. We also face an additional debt burden that may dwarf even the costs of our post-Covid recovery, and which threatens to cripple us. That problem – as mentioned earlier in the paper – relates to our ageing population and the strain it is about to place on superannuation and on our health system.

As of December 2019 (for all working New Zealanders over the age of 18, and those already in retirement), New Zealand had accrued a liability (undiscounted) of roughly $695 billion in relation to future NZS payments; more than 2.2 times New Zealand's nominal GDP in 2019. Even if we offset the assets of the Cullen Fund (roughly $42 billion), we are still left with an undiscounted current liability of roughly $650 billion. Assuming no population growth, which is

highly unlikely, this liability will continue to increase by some $30-40 billion a year.

This figure is calamitous in itself, but there remains the matter of health costs, for those aged 65 and over, to add to it. With around 45% of core Crown expenditure on healthcare going to those aged over 65, we can see that, *in 2019, the government spent, on average, $10,500 per person for those over 65 in health-care.* If we index the rise in health-care to 4% (lower than Treasury's long-term forecast), that means the total cost for someone with 20 years retirement is approximately $313,000 (in 2019 dollars).

These are startling figures, frightening even, and yet they remain unfunded. If we consider such healthcare costs on an accrual basis, like superannuation, we can see an accrued liability in relation to retirement healthcare costs of over $500 billion. Taking both New Zealand Superannuation and healthcare costs together, we had an undiscounted accrued liability in 2019 of over $1.2 trillion.

Unfortunately for New Zealanders, we are not able to see the true costs of our current policies because the Government deems that such liability does not 'accrue' until you apply for such an entitlement. While it is certainly arguable as to when we should deem a policy to accrue for accounting purposes, this misses the point. Just because you can pretend it is not a liability for the purposes of accounting, does not alter reality. New Zealand's current scheme is racking up significant unfunded liabilities with no thought as to how they will be met in the future. If the Government were more straightforward about its future liabilities, we could have a serious discussion as a nation about how we are going to meet them.

If we did account for such liabilities, we believe it would show a simple truth: without change, we are on a path that will see us struggle to meet our future debt obligations, something made all the more apparent, and urgent, by the

additional debt we are about to incur as we deal with the economic fall-out from Covid-19.

How, then, are future governments going to care for citizens aged over 65, who have been brought up to believe that the government will look after them upon their retirement, and who have every right to expect they will live comfortably once they have stopped work? Under the current system, the simple – and tragic – answer is this: 'they're not'.

As the authors noted at the start of this paper, you can't begin to fix something until you admit that it is broken. Scandalously, a string of New Zealand governments have refused to acknowledge our looming debt crisis. Instead, they have maintained the fiction that they are running surpluses, refusing to take into account future liabilities that have already accrued.

If a company kept its books in the same manner as the Government in relation to its employees' retirement savings scheme, it would rightly be brought before the courts on fraud charges.

The Government needs to find the courage to face this crisis (which begins by admitting it exists), instead of indulging in the empty politicking that comes with pretending that everything is okay, leaving it to future governments, and our younger generations, to deal with the mess.

Conclusion

For too long, we have lived with the fiction that we are doing well, lulled by successive governments into believing we truly do have a 'rock-star' economy. Nothing could be further from the truth. Starting with Grant Robertson's post-Covid budget, we must admit to the problems facing our economy and begin to deal with them. Otherwise, current inequalities will remain entrenched, we will continue to fall

further behind our OECD partners, and the prosperity of our younger generations will be placed at peril.

4 Development and underdevelopment from the perspective of evolutionary socioeconomics in the post-COVID-19 era

Charis VLADOS [†]

Introduction

The focus on the problematics of development and underdevelopment is already central among other in the works of A. Smith (1776), J.S. Mill (1848) and K. Marx (1867). Following the debate, Schumpeter's (1942) approach was the first that highlighted the concept of continuous and revolutionary business innovation. Georgescu-Roegen (1971), for his part, argued that evolution is the result of a "natural law," an entropic process where the

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status, matter and energy of the current situation are degraded to give their place to a new one. In various works since then, thorough research and analysis have been conducted on the phenomenon of economic development and underdevelopment, perceived as something more profound than the mere accumulation of quantities and economic values (Alcouffe & Ferrari, 2008).

Today, the current socio-economic and pandemic crisis of COVID-19 causes multiple adverse mutations. A steep rise of poverty in various areas of the planet, the multiplication of deaths due to falling incomes below the survival threshold, and profound increase in unemployment and collapse of various industries, especially in less developed regions worldwide, all sum up for a challenging future ahead (International Civil Aviation Organization, 2020; International Energy Agency, 2020; OECD, 2020). More specifically, the World Trade Organization has forecasted that the COVID-19 crisis will surpass in most indexes the corresponding economic crisis of 2008-2009 (Azevêdo, 2020), and, respectively, the IMF (2020) and the World Bank (2020) have forecasted a global recession for 2020 of more than 4% to 5%. At the same time, the United Nations (2020) has noticed that extreme poverty will rise again to a particularly worrying extent, especially in less developed countries around the world, while the International Labor Organization (2020) has observed that more than four hundred million jobs have been lost within the first months of 2020. For various analysts and policymakers, the pandemic and socio-economic crisis of COVID-19 is a passage to a new phase of global evolution: more specifically, "a gateway between one world and the next" (Matthewman & Huppatz, 2020), or an irreversible reality in which there can be "no return to normal" (WHO Director-General, 2020).

Therefore, the prospects for the immediate future in the post-COVID-19 era for various less developed regions is exceedingly worrying. The dynamics of underdevelopment in these areas seem to take on new forms and dimensions and become even more severe and painful, as well as new forms of exclusion and lagging will be added to their structural weaknesses (FAO, 2020). For these difficult cases, re-entering into a development trajectory seems to require new adaptive and functional capabilities that they currently do not have, and it seems exceedingly toilsome to build and cultivate—such as digital applications, intangible infrastructure and knowledge, strategic repositioning, modern management methodologies (Mhlanga & Moloi, 2020; Modiba & Kekwaletswe, 2020; UNESCO *et al.*, 2020; Vlados, & Chatzinikolaou, *et al.*, 2019). In this sense, an in-depth reorientation towards an evolutionary, holistic, and unified way of understanding socio-economic development and underdevelopment seems to be increasingly imperative nowadays for providing the necessary theoretical background to articulate new appropriate public policies, especially for the less competitive and resilient socio-economic systems.

This article approaches the evolution of the problematics of development and underdevelopment, offering an overview of the principal critical dimensions raised over the years. We perform a semi-systematic review and assessment of the literature (Snyder, 2019), and our goal is to offer a restructured theoretical framework that will function as a repositioning to the study of this theme under investigation. The primary goal is to counter-propose an evolutionary interpretation that can be further used to analyze today's new global development problems and prospects.

The first step examines the essential conceptual framework of development and underdevelopment shaped throughout time in the scientific dialogue by critically

exploring fundamental definitions of these concepts and emerging issues concerning quantitative indicators in measuring the phenomenon. The second step examines the essential theoretical components of evolutionary economics in studying socio-economic development, from the foundations of this theoretical stream to the present day, resulting in the suggestion of an evolutionary conception of today's developmental aspects by unifying the analysis at the "micro, meso, and macro" economic and social levels. More precisely, the following questions are examined:

- What do development and underdevelopment mean, how can we define and approach these concepts over time, and what theoretical instruments are available to classify and measure them nowadays?
- How and to what extent do evolutionary economic science concern the theorization of current and future development and underdevelopment challenges?
- Is it possible for a holistic, interdisciplinary, and evolutionarily unifying approach to function as a new theoretical "mechanism" to enrich the interpretations and analyses offered in the context of these problematics and to perceive the in-depth restructuration of socio-economic development?

What do development and underdevelopment mean?

Since the foundation of the specific discipline of economic development in the post-WWII era, its precise theoretical identity took shape and gained prominence in the relevant scholarly debate. According to Perroux's phraseology (Perroux, 1969), economic development means combining moral and social changes that enable a population to increase its actual total product in duration and cumulatively. In a similar vein, Behrman *et al*. (1988, p.xi)

notice two decades later that development falls within the theme of development economics, including the following analytical aspects:

> "Development economics has been defined as the study of the economic structure and behavior of poor (or less developed) countries [...] It is generally agreed that 'development' encompasses the reduction of poverty, improvements in the health and education of the population, and an increase in productive capacity as well as rising per capita income. Although the core concerns of development economics are clear enough, its outer boundaries are difficult to establish and essentially arbitrary."

Apart from the primary conceptual convergences on the subject, disagreement, interpretive divergences and theoretical re-positionings within the relevant scientific community never ceased to exist and be reproduced. The next sections analyze these fundamental aspects.

2.1. Fundamental definitions of economic development

In this socio-economic approach, a wide variety of definitions of development can be captured over time. In a book by UNESCO back in 1982 under the title "Different theories and practices of development," a comprehensive definition of development is provided (Iraida, 1982, p.25):

> "Development is integrated: it is an organic process involving a number of economic, social and cultural factors which overlap and constantly influence one another. Development is endogenous: each country carries out its development according to its own choice, and in conformity with the real values, aspirations and motivations of the population. Development is global: its objectives and problems are determined with relation to world problems and reflect the general nature of development [...] The society in which development is carried out is not

> isolated, but forms part of the network relations and forces that cover the entire world, including the most economically advanced societies as well as those which, from the economic point of view, are the most deprived."

From a convergent perspective, sustainable development is defined, which refers to a particular type of development dynamics that allows the needs of today's generations to be met, although without damaging the potential for the well-being of future generations. In other words, it is about a comprehensively perceived socio-economic development, which takes place by protecting, keeping, sustaining, and reproducing the "intact" potential of the natural environment—and not only that but also the cultural, political, and social environment—of the different societies of our planet. In the context of this theoretical understanding, the the socio-economic environmental limits are also perceivable, as the increasing—and sometimes irreversible—overall environmental problems at local, national, and global levels show this, often in a painful way. However, this conclusion cannot mean any extreme "environmentalism" or "neo-Luddism," which invokes the "return to the noble life of the savage" (Ellingson, 2001; Hannesson, 2015; McKay, 2020). Therefore, what becomes increasingly significant is not how much we produce and consume as human societies, but what we produce, how we distribute it and how we manage to achieve a sustainable growth potential with adequate equality and social sensitivity.

Also, an enrichment of the problematics is concerned with human-centered development and its implications. For example, according to the neo-Marxist approach by E. Fromm (1979), the primary interest should be attributed to human-centered development, arguing that production must serve man's actual needs, not the demands caused by the

economic system. The author concludes that exacerbated individualistic competition must be replaced by solidarity, the aim of all social arrangements should be human well-being, reasonable consumption instead of maximum consumption must be pursued, and the individual must be an active stakeholder in social life instead of passive. However, this approach does not equilibrium assess the significance of individuality, freedom, and ambition in implementing development efforts in all historical periods.

Today, the principal point of view concerning economic development is that it has a purely dynamic socio-economic character (Acemoglu, 2010; Andrikopoulos, 2019; Carayannis & Campbell, 2019; Kanbur, 2002). For example, in a recent report by OECD (2018, p.36), it is argued that individual and collective action is necessary for co-operation in terms of achieving development, geared towards seventeen sustainable development goals set by the United Nations[2]. In turn, the United Nations, together with these goals, attributes significance to the policy effort needed to combat inequality in human development. A relevant report of 2019 (Conceição & United Nations Development Programme, 2019, pp.1–4) concludes that we need to investigate inequality in human development beyond income, averages—and beyond today—based on five key messages:

> "First, while many people are stepping above minimum floors of achievement in human development, widespread disparities remain. […] Second, a new generation of severe inequalities in

[2] The seventeen goals are as follows: 1) no poverty, 2) zero hunger, 3) good health and well-being, 4) quality education, 5) gender equality, 6) clean water and sanitation, 7) affordable and clean energy, 8) decent work and economic growth, 9) industry, innovation and infrastructure, 10) reduced inequalities, 11) sustainable cities and communities, 12) responsible consumption and production, 13) climate action, 14) life below water, 15) life on land, 16) peace, justice and strong institutions, 17) partnerships for the goals.

> human development is emerging, even if many of the unresolved inequalities of the 20th century are declining. […] Third, inequalities in human development can accumulate through life, frequently heightened by deep power imbalances. […] Fourth, assessing inequalities in human development demands a revolution in metrics. […] Fifth, redressing inequalities in human development in the 21st century is possible—if we act now, before imbalances in economic power translate into entrenched political dominance."

The recent "World development report" of the World Bank expresses similar concerns, analyzing the theme of today's transforming working conditions (World Bank, 2019). The report raises the formalization issue in the traditional perspective of economic development, calling for a re-consideration based on understanding the forces of continuous change by setting as an example the changing working conditions and the relative "inertia" of labor laws. Various recent definitions, from different fields of interest each, shows us that the content of socio-economic development is still—undiminishingly and inevitably—broad and multidimensional:

- Peng *et al.* (2020) suggest that economic development is the fundamental basis for modernization, although the rapid development of the economy is often associated with the natural environment's destruction and massive energy consumption.
- Kumar *et al.* (2020) argue that economic development means the process of qualitative improvement in people's living conditions. Furthermore, economic development refers to progress in the social sphere, such as improvements in education and literacy, enhancement of quality of life, and better healthcare access.

- Palvia *et al.* (2018) think defining socio-economic development requires first understanding the term as closely associated (and sometimes interchangeably used) with the respective term of economic growth. However, the distinction between these two terms becomes evident when considering the concept of horizontal expansion and vertical advancement. For example, an increase in the service area of information and communication technologies by putting more cellular towers, laying more network cables, or allowing people in far off places to connect to Internet hubs means growth. On the contrary, development means vertical advancement where society moves from lesser to greater energy efficiency, quality of products and procedures, complexity, comprehension, creativity, enjoyment, and accomplishment.

Overall, it seems that there is an increasing interest in the holistic perspective of development against that of simple growth advancements (Marinelli, 2018; Peet & Hartwick, 2015). From the evolutionary perspective, the main trends are that development means primordially understanding the continuous contact and "communication" with the real (empirical) data provided by social and economic history. Also, denying any rigid perspective that entrenches and "over-specializes" the different branches of economics and social studies, heading towards interdisciplinarity, are equally observed trends (Augsburg, 2010; Klein, 1993; Stehr & Weingart, 2000; Vlados, 2020).

2.2. Basic underdevelopment approaches

Simultaneously, the definitions of underdevelopment keep referring to a concept with "variable geometry" that raises various analytical concerns. First, considering underdevelopment and poverty in terms of one of the first analyses by B. Rowntree (1941), poverty is determined by the

level of income by which nothing can be purchased except what is strictly necessary to sustain physical health. Rowntree (1941) also doubts whether a static and universal minimum wage exists, arguing that we need to understand the forces that hinder development in parallel, causing underdevelopment to appear. For many decades now, it has been evident in the context of this research field that underdevelopment is, in essence, dependent upon ideological and political aspects and criteria (Rowntree, 1941). More specifically, from S. Kuznets's (1955) perspective, underdevelopment is a comparative concept that can be defined based on a model (distance from the standard of living in developed countries), based on an assessment of what is possible (underemployment of resources) or based on what is necessary (insufficient "meeting" of needs).

The various approaches that perceive underdevelopment as a "capitalist development product" are not scarce in the relevant literature. According to the views of most neo-Marxist theorists, both older and recent (Amin, 1971; Frank, 1966), underdevelopment and capitalism are only two sides of the same coin. However, neo-Marxist approaches fail when they do not recognize that poverty and underdevelopment existed—even more intensely—well before the era of the so-called "deterministic exploitation of capitalism" and, as a result, the spatial concentration that causes uneven development and dependence relationships cannot be the sole cause of "misery" and suppression on the planet (Kotz, 2003; Mcdonough, 1995; Vlados, 2019d).

Are there any fixed patterns and characteristics of underdevelopment in today's global economy? What can the "archetypical" characteristics of an underdeveloped country tell us (Leibenstein, 1960)? The economic characteristics for a typical "less developed," "underdeveloped," or "developing" country can be the excessive size of the

agricultural sector and population, the reproduction of concealed (hidden) forms of unemployment, and the insufficient employment opportunities beyond the traditional rural sector (Cohen *et al.*, 2005; Kitching, 2012). They may also relate to staggeringly low per capita income—and, therefore, a standard of living on the threshold of survival for a large segment of the population (Ashaver, 2013). Also, most people will have almost-zero savings combined with a domestic investment "inertia" on the part of the wealthy strata of the population (mostly landowners), while the main "development" path will be exports of low value-added agricultural products and raw materials. The low per capita volume of trade and the barter system's survival, the fragmentation of agricultural land and the "perpetuation" of forms of agricultural production of low productivity, and the "typical image" of underdevelopment in terms of demography, culture, and technology are also similar conditions that cause underdevelopment (Bradshaw, 1987; Carlson, 2018).

Simultaneously, the standard profile of underdevelopment also includes demographic parameters such as high birth rate and mortality, and low life expectancy at birth, inadequate nutrition, and deficiencies in primary hygiene conditions for a large part of the population, and urban over-concentration and phenomena of "slums" within the cities (Campolina Diniz & Vieira, 2016; Charles Shapu *et al.*, 2020; Chen, 2010; Fox, 2014; Saxena, 2018). It also seems that underdevelopment is usually reflected at both cultural and institutional level, with the main characteristics being the significant level of illiteracy and inadequacies of education systems. There is also usually a perpetuation of "traditional" models of understanding social reality and weak social mobility, a degraded social and political status of women, ambiguity in setting property rights, not-intense competition, and phenomena of over-

concentration of economic and political power (Okafor *et al.*, 2007; Soto, 2000). Finally, underdevelopment is also reflected in terms of anemic knowledge production and diffusion and lack of material and intangible infrastructure, manifested in substantial deficiencies in sophisticated human resources, in the inability to quickly assimilate modern technology, at significant shortcomings in transport, communications, water supply, and health infrastructure (Aggarwal, 2007; Arocena & Senker, 2003; Downs, 2000).

By expressing an "anti-capitalist" point of view, Taylor (2016, p.166) views underdevelopment as "*a dynamic—not static—condition; it is a relationship and expresses a particular relationship of exploitation: namely, the exploitation of one country by another.*" Jalata (2015, p.75), who also blames "neoliberalism," argues that "*underdevelopment is characterized by dictatorship, powerlessness, joblessness, illiteracy, violence, hunger, famine, absolute poverty, disease, and untimely death.*" However, we should notice that such definitions might neglect significant development outcomes that were achieved in the front of battling with extreme poverty that occurred over the "evil" past years of globalization (Dollar, 2001; Friedman, 1999; Laudicina & Peterson, 2016; Rodrik, 2011; Vlados, Deniozos, & Chatzinikolaou, 2018a). On the contrary, from an evolutionary perspective, the following approach to underdevelopment by Perrotta (2016, pp.214–215) offers useful theoretical insight:

> "[…] we should stress that underdevelopment is not a synonym for backwardness. While the development economists of the 1940s and 1950s used the two terms interchangeably, later on a conceptual distinction emerged. In general, an economy is considered backward when it is poor and has not yet been touched by industrialization, and this distinction is based mainly on traditional agriculture. In the 1960s and 1970s, economists began to use underdevelopment in the sense of an economy

> which—although still poor and little industrialized—is transformed by a relationship with a stronger, more developed economy. The two economies develop a dependence on each other, in which the stronger one reshapes the other to its own advantage. It is a spontaneous, although not necessary, process."

All these dimensions suggest that an essential understanding of underdevelopment requires further processing and deepening the study beyond the narrow economic rationality, causes and effects. As Gillis *et al*. (1996, pp.24–25) aptly note:

> "Therefore, while there are economic causes for the prevalence of poverty in large parts of the world, economic explanations alone cannot account for why particular economic barriers exist. Economists are uncomfortable when they leave the realm of economic explanations, in part because the tools of economic analysis are of only limited help outside the sphere for which they were designed. But if one is seriously interested in understanding why some nations have had so much trouble initiating growth, there is little choice but to explore the relationship between economic development on the one hand, and political and social obstacles to development on the other."

2.3. Quantitative indicators of growth

Analyzing the development process and finding the development models that govern it forces us to investigate the correlation between different methods and factors used to present the specific economy's size. As is well known, Gross National Product (GNP) and GDP per capita are widely used as the primary growth indicators of a country's economy. Simultaneously, other composite economic and social development indicators have been developed over time.

Amongst the most significant is the Human Development Index (HDI), which is a statistic composite index that measures various aspects of social and economic reality, such as life expectancy, literacy level, and per capita income indices to grade the different countries in terms of human development (Hou *et al.*, 2015). Introduced by Haq (1999), this indicator achieved to cut off the traditional view of human development, which postulated that it was sufficient to consider only the Gross Domestic Product (GDP) of the country. Human Development Index uses different statistical standards to collect and analyze nationwide data, making it today the most popular measure of development (Kpolovie *et al.*, 2017). HDI is considered the most used indicator in this topic, even though it only correlates data at the national level, ignoring subnational variations within countries and diverse local idiosyncrasies; the recent research by Permanyer & Smits (2020) tries to address this problem.

Quite naturally, the process of "measuring" in development economics is not only an area of unanimous consensus but also a field of intense scientific disagreements and dispute. As Chalmers (1982, p.xvi) puts it, referring to the widespread problem of measurement in socio-economic sciences:

> "An inscription on the facade of the Social Science Research Building at the University of Chicago reads, 'if you cannot measure, your knowledge is meagre and unsatisfactory.' No doubt, many of its inhabitants, imprisoned in their modern laboratories, scrutinize the world through the iron bars of the integers, failing to realize that the method that they endeavour to follow is not only necessarily barren and unfruitful but also is not the method to which the success of physics is to be attributed."

Undoubtedly, the role of the theory of economic development, more profoundly than any partial measurement, takes place in signifying and giving specific

meaning to measurements related to the evolution of a socio-economic system. Most significantly, development economics needs to investigate how quantitative accumulations (growth) lead to qualitative transitions (development). This semantic process requires critical perspective and capacities to synthesize different socio-economic development approaches (Brinkman, 1995; Nnadozie & Jerome, 2019).

The traditional measurement of development and underdevelopment raises and other methodological controversies and doubts. For example, are these measurements legitimate? Various scholars are against a narrowly defined "Economism" (or "monoeconomics"), which reduces the complexity of social relations by referring only to quantifiable trade relations (Hosseini, 2003). Also, nation-centrism is equally in question because it usually compares the underdeveloped with developed nations, arguing that developed ones are examples to follow (Antunes de Oliveira, 2020). Finally, by considering only national balances and statistics, structural differences between societies are equated with fluctuations in their economic flows and sizes (Wang *et al.*, 2008). Another question is whether measuring development is a reliable technique. Since underdeveloped countries have insufficient statistics (informal activities, "black" markets, and incomplete statistical data collection mechanisms), measurements only make sense within the specific structure under investigation. As a result, it is impossible to make precise comparisons of the level of prosperity of a developed and underdeveloped economy and their substantial diversification at a cultural level (Kaldor, 1972).

There can be no doubt that both the "imperfections" and the "virtues" of the quantitative method emerge in this scientific debate. In this subject, the view of S. Kuznets (1930, p.440) seems to enlighten things up:

> "The theoretical economists of today are therefore right when they attack the quantitative approach, both in its relevance to static theory and in reference to its doubtful fruitfulness. It is an unsatisfactory approach if one wants to have a basis, unreal as it may be, for providing definite answers to questions of social desirability or social effects of a certain change. In such a criticism, however, two considerations are overlooked. (1) In preparing the ground for solving practical problems, the quantitative method cannot be neglected. Many an economist would profit by knowing the different factors at play, the various groups of changes already marked out by quantitative investigators to look for in any analysis of original data. (2) The potential fruitfulness of the method will materialize only after the body of inductive data has been accumulated and analyzed, after the ground is prepared for whatever systematic construction is to take place. It is in the future that the system of dynamic economics will be evolved by a concerted effort of both the inductive workers and of the theorists, probably combined in one and the same group of students."

Therefore, various criticisms exist on the appropriateness of conventional economic growth indicators as a means of capturing the issue and extensions of economic development. The primary criticism is that there is an inability to make "objective" comparisons and, therefore, a "silent" acceptance of "myopic" averages takes place (Chiras, 1995). As there is substantial and lasting heterogeneity between prices and values between developed and underdeveloped economies, international accounts' homogeneity is incomplete. In this context, the domestic purchasing power of money in the least developed countries is greater than that of the official exchange rate. Simultaneously, there are (and often dominant) non-tradable goods in the least developed countries. There is also a

usually informal, non-statistically reflected economy, which is not fully included in the analysis, although it is an integral structural part of their economic system. Therefore, behind the use of empirical indicators, evaluative judgments, cultural and moral stereotypes exist (what is better and what worse, for the organized life of a society?) and internalized paradigmatic imperatives, which the simple quantification does not seem to have the necessary conceptual tools to capture altogether (Brown *et al.*, 1992; Papanek, 2002; Vlados, Deniozos, & Chatzinikolaou, *et al.*, 2018).

We conclude that growth indicators' correlation enables us to make useful international comparisons, construct typologies, and develop econometric models in instantaneous sections or chronological orders. It cannot, however, define the content itself, the essence of development. This correlation of "development indicators" tends to reduce the complex interconnections of the socio-economic organizations under investigation into simple correlations between mechanistically interdependent variables (Mirowski, 1992; Vlados, 2019a). It can thereby build technical "black box" models based on the logic of simulation, which do not necessarily construct and integrated and theoretical framework (Rosenberg, 1994). On the contrary, evolutionary economics (whose elements and extensions will be analyzed in the next section) seems to study—far more profoundly than any mechanistic approach—the dynamics of development and underdevelopment when it presents and structures a framework to examine the historic and path-dependent socio-economic development.

Evolutionary economics and today's theorization of development and underdevelopment

Evolutionary economics is even to this day one of the "heterodox" currents of economic science. With the most concise definition possible, evolutionary economics sees the economy as a system in constant motion driven mostly by the forces of change and innovation. The scientific study of evolutionary phenomena—as a distinct field of analysis—is due to the monumental work of C. Darwin on the *Origin of Species* published in 1859. From a generic point of view—since this article does not intend to delve deeper into the science of biology—evolution means the self-transformation of an organic system based on the creation, absorption, and diffusion of novelty—innovation, in socio-economic terms. Once a new genetic variation occurs in one or more organisms, then it is the environment that decides the successful assimilation or failure of this novelty.

Moreover, in the years following the publication of Darwin's work, economists (in particular, Veblen, Marshall, and Schumpeter are the most prominent of them) started to underline the relevance of economic science to biology mostly and not so much to physics. In this sense, today's evolutionary economics are shaped by methodological orientations and arguments with profound theoretical roots (Andersen, 2009). The application of evolutionary thinking to economic analysis was first introduced at the end of the 19th/mid-20th century, first by T. Veblen and then by J. Schumpeter, while its roots can be traced in the works of classical economists and the school of Classical Political Economy. Classical economists and social scientists (among them Hume, Mandeville, Smith, Ferguson, Malthus, Babbage, and Jones) can be told that they were, in fact,

evolutionary economists as they studied the socio-economic background and dynamics of their societies (Hart, 2013; Vlados, 2019c).

Although Neoclassical Economics is primarily rooted in the Principles of Economics written by A. Marshall (1890) that was the primary textbook for economics for generations of economists, the evolutionary approach also has apparent effects from this "Marshallian tradition" (Antonelli & Ferraris, 2018; Becattini, 1990). Evolutionary economists present today an "unorthodox" interpretation of the Marshallian work, usually quoting a now-famous passage from Marshall's Principles of Economics in which he noted that "The Mecca of economics lies in economic biology rather than economic mechanics" (Hodgson, 1993). Therefore, although Marshall was the forerunner of the later "orthodoxy," his thinking is closer to evolutionary economics that is generally accepted. As far as evolutionary economics is concerned, it studies the processes that transform the economy into its foundations while exploring the interactions between firms and industries, production, trade, employment, and growth (Witt, 2008). More specifically, in the "evolutionary theory of the firm," the different socio-economic actors have and articulate individualized behaviors, which create—but also co-create, respectively—their entire socio-economic context of action, creating thus specific development trajectories. According to Nelson & Winter (1982), two of the principal authors in this stream of thought, firms are also biological organisms with specific routines—a concept "diametrically-opposed" to the conventional neoclassical maximization rationale—that continuously claim their competitive survival in an ever-changing environment.

According to Veblen (1898), who directly criticized the back-then prevailing theory of economic analysis, evolutionary economics is the theory of cultural

development through economic institutions' cumulative sequence. More specifically, Veblen wondered why the dominant economic science of that time was not an evolutionary science, giving interpretations that will later lay the institutional foundations of economic analysis by seeing the institutions through the prism of biological analogies (Foster, 1997; Levallois, 2011; Penrose, 1952). For Veblen, the individual's economic life is a cumulative process of adjustment to the surrounding environment. As G. Hodgson (1994, 1998) argues, Veblen adopted the Darwinian idea of natural selection but did not deny the role of "behavior," postulating that the basis of the targeted action is decided by the institutional environment, which includes all the structures that produce culture and behavior. At this point, opening an analytical parenthesis, it is worth noting that "natural selection," which is a fundamental concept of evolutionary biology meaning that the organisms that survive in nature are the more adaptive ones, differs from "behavior" in the sense that "socio-economic organisms" do not only passively adapt but are active adaptation actors through their innovative action[3].

Therefore, the institutional school of thought, which appeared after Veblen's contribution (with important representatives being C. Ayres, J. Commons, and W. Mitchell), abandoned Veblen's analytical effort to fuse biology with social sciences. The decoupling between the institutional stream of thought and the evolutionary approaches in the period that followed is mainly because Veblen (like Marshall in this research orientation) was unable to systematize and suggest a comprehensive analytical framework, such as to incorporate the

[3] However, it is worth stressing that most neoclassical models of dynamic monopoly concern firms that shape market conditions rather than passively accept them (Bensaid & Lesne, 1996; Bose *et al.*, 2006; Gul *et al.*, 1986; Pindyck, 1985).

evolutionary dimensions that economic change always carries (Hodgson, 2012; Schütz & Rainer, 2016; Waller, 1982).

The theoretical renewal of evolutionary economics before the second half of the 20th century and later is mostly due to J. Schumpeter and the neo-Schumpeterian economists and successors (Chatzinikolaou & Vlados, 2019; Hanusch & Pyka, 2007; Levinthal, 2006; Magnusson, 1994; Perez, 2010). Schumpeter developed a dynamic perspective based mostly on Karl Marx and the German Historical School's dialectics by emphasizing each socio-economic system's historical specificity and the continuous creative destruction in industrial terms (Michaelides & Milios, 2009). Schumpeter's work was also influenced by the neoclassical tradition, as he adopted ideas of early theorists of "general equilibrium" without limiting his evolutionary micro-economic point of view (Andersen, 1996). Schumpeter (1939) specifically defined economic development to describe the changes in the economic process caused by innovation and how different economic systems react to innovation. Arguing that the capitalist process involves an inevitable evolutionary character, Schumpeter (1942) stressed that the fundamental impulse that drives the capitalist engine comes from new consumer goods, new production and transport methods, new markets, and new industrial organization forms shaped by the capitalist enterprise.

In this way, economic development is presented in Schumpeter's view as spontaneous and discontinuous and characterized by imbalances that rearrange the earlier equilibrium regime. Innovation, imitation, and competition based on technology lead to qualitative transformation and "creative destruction" where old and "saturated" means of production, as well as the social arrangements that produced and "hosted" them, are progressively driven to destruction (Pacheco *et al.*, 2017; Schubert, 2013). In this context, a dialectic development in the economy is inevitable, as

prosperity itself cultivates the "necessary" resources of its future destruction internally. Schumpeter (1942, p.83) stresses the following on this:

> "The opening up of new markets, foreign or domestic, and the organizational development from the craft shop and factory to such concerns as U.S. Steel illustrate the same process of industrial mutation—if I may use that biological term—that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism. It is what capitalism consists in and what every capitalist concern has got to live in."

However, in Schumpeter's thought, the usefulness of the "biological paradigm" of interpreting economic phenomena is not explicit. It is a fact that Schumpeter himself was "temperate" to Darwin's invocation and other biological mechanisms of differentiation, heredity, or natural selection to describe economic structures. As Schumpeter (1954) mentions in the last and incomplete magnum opus on the History of Economic Analysis, the term "biological sociology" does not exist.

Schumpeter was also opposed to Veblen's view of the prospect of studying economics through a Darwinian approach, whose work, according to Schumpeter, falls under economic sociology. A similar belief in Veblen's role in the foundation of evolutionary economics seems to be shared by Nelson & Winter (1982) since they do not refer at all to Veblen's work in their milestone book "*Evolutionary theory of economic change*." Later, however, Veblen's contribution—mostly by writers of Hodgson's theoretical stream of thought—is recognized as key to the foundation of evolutionary economics (Hodgson & Lamberg, 2018).

Simultaneously, modern evolutionary economics has its roots and is bifurcated into another significant stream of

thought based on the "Austrian School." The Austrian school started with Carl Menger (1871), who developed the theory of money formation at the end of the 19th century, arguing that the origin of money is natural and not an invention of the state. Friedrich Hayek and Ludwig Von Mises, two of the most eminent continuators of this stream, further developed this theory by incorporating evolutionary characteristics. For Hayek (1988), institutions' creation comes primarily from human action rather than human design, showing a "spontaneous order" of institutions. For Mises (1949), this human action shapes the market economy by dividing labor into a long evolutionary process.

To sum up, evolutionary economics is therefore divided into three prominent "theoretical families," each with specific roots and diachronic influences (Kwasnicki, 1999): institutional economics, neo-Schumpeterian economics, and Austrian economics (Figure 1).

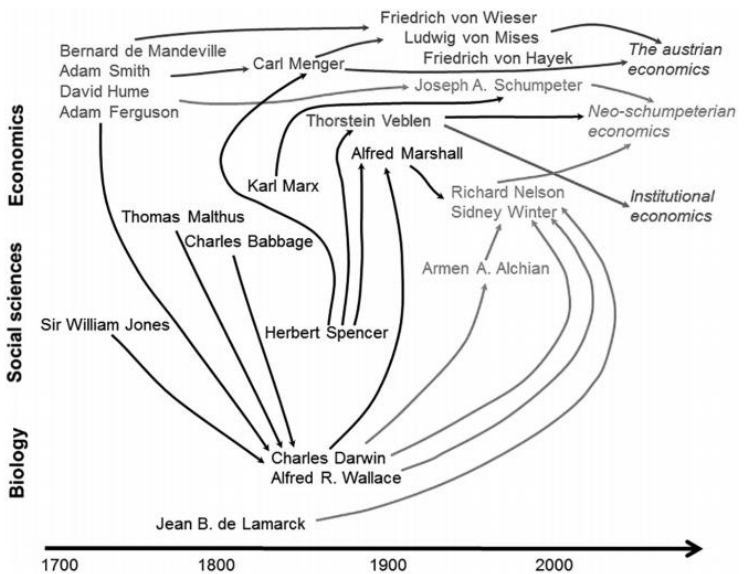

Figure 1. *Diagrammatic representation of the theoretical foundations of evolutionary economics and mutual influences (Kwasnicki, 1999).*

All three schools of thought focus on economic dynamics, clearly arguing that analysis epicentered on the system's static equilibrium is insufficient in analytical terms. In the background, evolutionary economics differs from the "standard" economic analysis to the extent that it studies continuous change and innovation. The dynamics of innovation means that new elements of change are continually being introduced and absorbed into the different interconnected socio-economic systems, while others are being driven to their inevitable extinction.

Where are we today, and how does the scholarly literature cover socio-economic issues from evolutionary economics' perspective? Below we focus on an elliptical but essential sample of evolutionary contributions to socio-economic sciences, presenting various relevant perspectives developed over the past twenty years. We examine at their diachronic development some of these approaches, which seem to be directly linked to the articulation of today's problematics of development and underdevelopment:

- Boschma & Lambooy (1999) try to apply evolutionary thinking to economic geography, arguing that we should perceive regions as spatial entities that identify, select, or influence firms' innovative capacity. In this context, the firm affects its spatial contours with its action, but the "space" itself also is a reproducible evolutionary unit.
- Martin & Sunley (2007) think that new knowledge (innovation) appears on a small scale in local contexts in a similar methodological direction. They also argue that evolutionary economic geography should consider geographical space's role in creating and diffusing economic novelty.
- According to Dopfer & Potts (2008), there is a "general theory" of economic development that is not limited to the study of "micro" processes, nor can it be exhausted

in detail at the cumulative "macro" level as today's economic growth theory postulates. They suggest that we need an integrated "micro-meso-macro" framework, in which the "micro" examines how different actors produce and keep new "rules," the "meso" investigates how these "rules," industries and institutions are transformed, and the "macro" analyzes how "meso-units" are coordinated within a historical development trajectory.

- Safarzyńska & van den Bergh (2010), who explore how evolutionary models are classified in economics, argue that a comprehensive understanding of the economy as an evolving system requires the construction of models in which the consumers and producers have equal value, in a relationship of co-evolution of supply and demand.
- Heinrich (2016) then argues that there are substantial differences between evolutionary biology and the evolution of institutions, businesses, and strategies in economics. There is no genetic coding (DNA and RNA) or sexual reproduction in economic development because the actors involved can deliberately intervene. However, the author suggests that extensive mutation phenomena in socio-economic organizations periodically lead to the exclusion of "the fittest." Protecting small businesses by sustaining their knowledge could contribute to stability and limit these random variations. Heinrich (2017) also postulates that specific evolutionary economics models are based on metaphors from genetic evolution, assuming a population of enterprises with specific routines, technologies, and strategies where the forces of variety generation and "natural selection" occur. This "narrow" conceptualization, the author argues, could be enriched with the "broader" findings of evolutionary

biology that allow one or more entities to adapt. In this context, an institution or society can also be perceived as an evolutionary entity in developmental terms.

- Araujo & Teixeira (2011) investigate what mechanisms prevent technological progress diffusion from developed to underdeveloped countries. They argue that an approach of "structural economic dynamics" enables studying the problem from an industrial perspective while the evolutionary approach focuses on enterprises' dynamic abilities to highlight innovative complexity. The authors conclude that technological progress diffusion is due to the specific operational or industrial environments, such as the level of per capita income and the sum of institutions.
- Sica (2016) compares the neoclassical with the evolutionary approach to "eco-innovation," arguing that neoclassical theories focus on analyzing incremental eco-innovations and researching specific innovation characteristics such as efficiency, prevention, or environmental regulations. In contrast, the analysis of eco-innovation in its dynamic and multidimensional nature through the evolutionary approach perceives the issue as correlated with the interactions between technical, social, and economic elements.
- Potts (2017) stresses that Keynes did not develop an endogenous interpretation of innovation or economic transformation like, for example, Schumpeter did. Potts argues that if Keynes had developed such a theory, he would have focused more on institutions' role in continually reinventing the economic system, creating new opportunities for entrepreneurship and production in broad terms.
- Monasterolo, Roventini & Foxon (2019) argue that approaches based on evolutionary economics could

strengthen existing traditional economic and financial models for managing the risk of climate change by analyzing the micro and macro behavioral levels of systems characterized by non-linearity and time dependency.

Altogether, the newer evolutionary approaches to the points that intersect the theme of economic development seem to attribute an increasing significance to the study of the continuous interaction and co-determination of the functional and spatial dimensions of the development process. In the background, in terms of studying the development process, they see the innovative dynamic in all its aspects as the primary pillar of socio-economic development. In this evolutionary approach to development, it is noted that a call to an evolutionary perspective of economic geography, where socio-economic space is also reproduced evolutionarily and not just the firms and the sectors. Finally, in the evolutionary development point of view, the transfer of analogies from evolutionary biology to economics now seems to be a standard reference for evolutionary economics; all firms, industries, institutions, and other socio-economic actors, although they do not face biological and genetic variations, are biological organisms capable of "deliberate" intervention, continuous learning, and adaptation.

Concluding remarks: The integration of "micro, meso, and macro" social and economic analysis in the evolutionary understanding of development in the post-COVID-19 era

It seems that the theoretical preoccupation of evolutionary economics—the emphasis on the study of innovation, the rejection of individualistic rational optimization (Urbina & Ruiz-Villaverde, 2019), and the ongoing interest in the evolution of institutions—acquires increasing significance in today's conditions of globalization's restructuring (Altman, 2020; Bhattacharya *et al.*, 2017; Kotler & Caslione, 2009; Larionova & Kirton, 2020; Vlados, Deniozos, & Chatzinikolaou, 2018b). In this context, It becomes evident in socioeconomics that correlating quantitative indicators is useful but not enough to study profound developmental/underdevelopmental structures and dynamics of today's global socio-economic system. In these circumstances, evolutionary economics emerges as an integrated theoretical framework that leads to new directions of understanding how socio-economic actors behave at all levels of their economic and social symbiosis. In effect, various developments in today's evolutionary economic analysis appear, which open new paths to conceive the issue of development and underdevelopment. These developments also seem to be of particular importance in structuring a renewed conceptual framework to understand the development process and address the worldwide difficulties we will have to face in the post-COVID-19 era.

More specifically, today's evolutionary economics invites us to deny any rigid autonomous theoretical perspective in social sciences, entrenched in partial specializations and

disciplines. On the contrary, it seems to argue—in an increasingly convincing way—that to approach the thorny issue of economic development fruitfully, we must try interpreting socio-economic development components, structures, and dynamics in a consistently interdisciplinary, synthetic and dialectical way (Fine, 2019; Mainzer, 2011; Morabito *et al.*, 2018; Pacheco *et al.*, 2017; Vlados, Deniozos, *et al.*, 2019; Williams, 1989).

In the background, the analytical perspective of evolutionary economics argues that it is not enough to perceive the "engine" of socio-economic development only in the individual "screws" that make it up. We must always search at how this "engine" transforms structurally and evolutionarily its entire architecture's content and qualities. Moreover, we call on this repositioned concept of the socio-economic system's mutation because we are not dealing with a simple "engine," but with a living entity in continuous development.

Furthermore, according to Dopfer & Nelson (2018, p.9), an "explicitly evolutionary" perspective is necessary, combined with a "reform movement" oriented at breaking the monopoly of neoclassical theory "*on conceptualizations at a general level of what economic activity and structure are about that professional economists know and teach*." A fundamental orientation in the evolutionary socio-economic approach is that within the socio-economic system of capitalism, all "socio-economic organisms" evolve like biological organisms, whether they are microeconomic actors, markets, or other kinds of social institutions (Nelson, 2018). According to the converging view of Pyka *et al.* (2018), to understand how long-run economic development is structured from an evolutionary perspective, we must distinguish and synthesize the wide range of different interrelated perspectives. More specifically, Pyka *et al.* (2018, p.166) argue that we must explore, at the same time:

> "the relationships between technological advance and the rising capital intensity of production and of labor productivity that have been striking features of economic growth particularly when viewed at a macroeconomic level […] the changing mix of industries and products produced and consumed that also are salient features of the economic development we have experienced […] the changes in economic institutions that has been another striking feature of the economic development process, and how this has been related to the evolution of technologies and economic structure that have occurred."

In this theoretical background, modern evolutionary economics encourages a synthetic repositioning of development economics in unified "micro-meso-macro" economic and social terms[4]. To this end, this approach could be further fertilized and strengthened by merging into a shared interpretive platform all three basic analytical levels of economic and social sciences simultaneously.

4.1. Microeconomic and microsocial analysis

The first approach it synthesizes is the microeconomic and microsocial aspects of the development phenomena, which concern a specific approach to problems, usually limited to analyzing the behavior and action of units

[4] Therefore, we directly agree with the view of Galbraith (1987, pp.295–297), whose related argument is expressed as follows: "*The distinction between microeconomics and macroeconomics will blur and disappear. This distinction, which, to remind, was the legacy of Keynes, gave responsibility for overall economic performance to the state and the central bank, leaving the traditional role of the classical market to the individual sectors of the economy. Inflation and unemployment were for macroeconomic attention; if they were thereby controlled, the microeconomic performance of the market could be left in firm descent from classical orthodoxy. The compartmentalization of economics between microeconomics and macroeconomics hides the most stubborn cause of present-day unemployment in the mature industrial countries: the decline of the older industries. And it also hides the relevant solutions.*"

working within the economy and society (individuals, groups, and organizations). Microeconomics refers to the study of factors deciding the relative prices of goods and inputs, focusing on the different relevant markets (Gavetti *et al.*, 2012). In terms of evolutionary economics, the approach of firms' behavior and capabilities assumes that firms do not and cannot "optimize" because they always make decisions that are only relatively satisfactory. According to Helfat (2018), firms are profit-seekers rather than profit maximizers, while the organizational routines—and the capabilities they sustain—shape this profit-seeking behavior. As firms are the most significant players in innovation and the development of a socio-economic system, the economic catch-up between different socio-economic systems is primarily a cumulative process of learning and assimilating new capabilities. According to Lee & Malerba (2018), this evolutionary process always takes a long time. To this end, a significant intersection arises—based on the "evolutionary microsociology" that we suggest—where it becomes clear that we also need to simultaneously refer to the relationships between social members in small groups (for example, in terms of family organization). However, we should not consider the individual from the "isolationistic" perspective that most microsocial approaches do (Cherkaoui, 2003; McQuarie & Denisoff, 1995; Meyer, 2019).

4.2. Macroeconomic and macrosocial analysis

The second is macroeconomic and macrosocial analysis, which concerns the specific way of approaching economic phenomena in their overall, cumulative economic and social dimension. More specifically, macroeconomics refers to the study of factors deciding the economic system's flows and sizes altogether, including economic cycle phenomena and growth (Grinin *et al.*, 2016). Apart from the explicit macroeconomic perspective, there seems to be a great deal of

interest in the interpretive combination with macrosocial research to study development dynamics. According to macrosociology, this theme refers to the study of large-scale phenomena, covering a broad range of topics that include groups and institutions of diverse sizes, trying to encompass all human society and history (Borgatta & Montgomery, 2000). In an evolutionary context, the joint approach of macroeconomics and macrosociological development information seems to give the ability to treat the dynamics of development of the different socio-economic systems from an integrated and historical perspective.

4.3. Mesoeconomic and mesosocial analysis

Third—and perhaps the most significant—level exploring the development process we think is the meso-analysis that analytically "bridges" the "micro" and the "macro" levels. Mesoeconomics concerns the specific way of approaching economic phenomena in their intermediate, dynamic, and evolutionary socio-economic dimension, referring to the study of the factors that decide the structural dimensions and sizes of the economic system under investigation (Mann, 2011; Peneder, 2017; Vlados & Chatzinikolaou, 2020; Zezza & Llambí, 2002). More specifically, under the scope of mesoeconomics fall specific localities, different economic sectors or industries, their concentration, and their internal and evolving forms of competition and innovation (Moore, 1993; Porter, 1998; Vlados & Chatzinikolaou, 2019). In this context, technological advance is an evolutionary process in which "*different kinds of actors and activities are involved, and both market and non-market institutions*" (Dosi & Nelson, 2018, p. 72). As Dosi & Nelson (2018) suggest, the firm is the most significant structure that houses these activities and the practices governing them in contemporary economies. At this point, the synthetic exploration of the various social dimensions that lie at the foundations of the dynamics of

these meso-systems (meso-social)—such as the production and diffusion of knowledge, the reproduction of cultural patterns, mentality and lifestyles in the different socio-economic systems—seems to be of significant interest in understanding the broader dynamics of development and underdevelopment. The reason behind this is that meso-social structures—such as the organization of the work-place—can offer an enlargement of our theoretical comprehension because they encompass all relevant levels of social organization (Levy, 2002; Pyka & Nelson, 2018; van Wijk *et al.*, 2019).

4.4. The multilevel "development web" approach

We think an integrated and holistic evolutionary approach forms the basis for a necessary regeneration and the explicative enforcement of the modern economic development theory. We argue that these three approaches (micro, meso, and macro) to the economic and social phenomena are not "by definition" incompatible or conflicting with each other. As evolutionary economics proves, they can be analytically distinguished because they have a different starting point, although they are robustly complementary and mutually reinforced in analytical terms[5]. The unified "micro-meso-macro" analysis shows that these three spheres are entirely inter-fertilized in exploratory

[5] In this context, we also meet a similar critical perspective of Ruttan (1998, p.16), who offers a respective insight on the subject: "*My own sense is that the most significant advances in knowledge about economic development will continue to emerge from research conducted at the micro-level. The real sources of growth that result from efficiency gains, technical change, institutional reform and design can only be observed and understood by investigations conducted at the household, firm, and sector level. The effects of those technical and institutional changes generate the disequilibrium effects that are captured at the aggregate level in measures of scale economies and total factor productivity growth.*"

terms, and, in this sense, modern economic development must use them in a synthesizing way (Dopfer *et al.*, 2004).

To this end, we suggest the extension of the "competitiveness web" approach (Vlados, 2019b) to what we call the "development web" approach (Figure 2). The competitiveness web approach forms an analytical enlargement and enrichment of Porter's "diamond" theoretical framework.

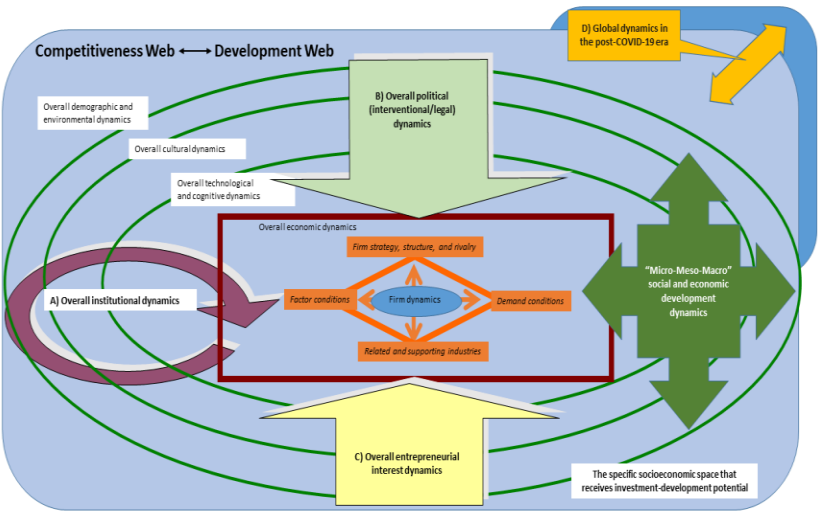

Figure 2. *From competitiveness web to development web. Based on Vlados (2019b).*

According to the competitiveness web approach, at every level of space (local, national, regional, and supranational), a system of forces is always shaped and reproduced, simultaneously created (and constantly re-created) by various sub-systemic socio-economic dimensions. Each specific socio-economic space receives—to a greater or lesser extent—a specific investment dynamic, based on the entire attractiveness it cultivates and diffuses (Atkinson, 2012), and the ability to sustainably reproduce its internal balance; all these dimensions practically decide its development

potential and perspective. In this context, demographic and environmental dynamics, cultural dynamics, technological and cognitive dynamics are synthesized, together with the overall economic dynamics related to the entire system at the level of economic sectors, clusters, and actively hosted firms. All these sub-systemic dimensions are co-evolving and co-determined, concretizing the specific spatialized socio-economic system. Within this system, there are four significant poles of action that decide its specific competitive trajectory:

A. The pole of the entire institutional dynamics that crystallizes the system's existing structures and balances at all levels, in terms of specific institutional forms and agents.
B. The pole of the entire political, interventional, and legal dynamics defines the activity limits of the different actors who coexist in the system.
C. The pole of the entire entrepreneurial interest dynamics reflects the extent to which this socio-economic system can draw and assimilate investment interest both internally and externally.
D. The fourth and last pole is the one that reflects global dynamics, expressing how this socio-economic is inserted and live together (symbiosis) with its broader international environment.

These four poles of dynamics interact in actual terms and reshape the socio-economic system's specificity (idiomorphy) incessantly. At this point, the critical significance of "micro-meso-macro" development dynamics appears as the primary synthesis element of the entire socio-economic system. Therefore, in practice, this competitiveness web seems to be "the other side of the coin" of each socio-economic system's development physiognomy, as the shortcomings and weaknesses that appear in the competitiveness web of each socio-economic system lead

directly to the deduction of its positive development prospects. This close interconnection becomes increasingly significant for the near future, especially in the effort of each less powerful and competitive socio-economic system to insert itself into a new positive development trajectory in the post-COVID-19 era.

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5 What can the U.S. learn from its covid-19 response?

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Introduction

As of August 10, 2021, the Covid-19 pandemic has caused approximately 4.3 million deaths and about 203 million confirmed cases worldwide (Coronavirus Resource Center, 2021). In the United States, the virus has killed over 600,000 people. The federal government was slow to respond and the effectiveness of its policies was debatable. It did a poor job gathering information about the virus and disseminating a clear, consistent message to guide public behavior.

I do not want to scapegoat individuals for the Covid-19 response in this essay. Rather, it represents an economist's inquiry. I am not a public health expert, and this is not a direct guide to an effective Covid-19 response. Rather, I

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incorporate some key economic principles to talk about the United States' response to Covid-19 in the hope that it improves public health responses in future pandemics. The emphasis is on the performance of governments and institutions involved in pandemic response. The principles I emphasize are:

- Knowledge is not always pre-existing, but markets can help generate it;
- Governments can help create knowledge through research funding; but they can also hinder it with inappropriate regulation;
- Public attention is a scarce resource; and
- Policy makers and the public should be aware of the costs and benefits of certain decisions, for example the benefits of lives saved through lockdowns versus the cost of rising unemployment and inadequate care for patients with pre-existing conditions.

The Centers for Disease Control (CDC), the main institution responsible for addressing situations like the Covid pandemic in the United States, took a relatively long time to publicize the seriousness of the virus. Despite monitoring travelers from China, the CDC neglected the dimension of the spread of Covid-19, which had already affected China's neighbors. It is important to look at what countries close to the center of the virus have done to detect and prevent the virus. The most instructive case is probably Taiwan, which has registered one of the lowest death rates due to Covid-19.

Since we now have some knowledge about the virus, we have made some progress, but we still have a long way to go. Vaccine efforts started under President Trump and President Biden set vaccination goals that are appropriate. Authorities were so eager to get a vaccine that they funded many firms in hope of finding something fast and effective. This would be a good policy to repeat in case of another

pandemic. However, vaccination efforts should not be concentrated in the United States, as the virus is still spreading and becoming more contagious. There is also the problem of vaccine wastage: many countries do not have the appropriate infrastructure to store and distribute the vaccine (Cowen, 2021).

This paper is an attempt to summarize some of what we can learn from the ongoing Covid-19 pandemic as a means to generate new knowledge. The evidence shows that the United States was not prepared and that international cooperation during the crisis was at best weak. Therefore, there needs to be discussion about the costs and benefits of certain policies, both domestic and international. The goal is to use what we currently have to think about a more economical approach to future pandemics.

Throughout the paper I will discuss good and bad U.S policies and the implications for future pandemics. The paper starts with an analysis of the different stages of detection and prevention response, progresses to production and distribution, and examines Covid-19 research and publicity. I will also look at what other countries closer to China, where the virus originated, have done to try to detect and prevent it. The research will try to answer these three questions: 1) How did the U.S react to the Covid-19 pandemic? 2) What did countries with fewer cases per capita did better than the U.S.? 3) What can we learn for the future?

Table 1. *Key Covid events, with an emphasis on the United States*

2019	
December 31	China reports cluster of cases
2020	
January 9	Official WHO announcement about coronavirus-related disease in China
January 21	First U.S. official case; Chinese scientists confirm human transmission
January 31	WHO issues global health emergency; U.S. travel ban applied to China
February 3	United States declares public health emergency
February 25	CDC announces Covid-19 is approaching pandemic status
March 11	WHO declares Covid-19 a pandemic
March 13	President Trump declares Covid a national emergency; travel ban on non-U.S. citizens traveling from Europe
March 19	California becomes the first state to issue stay-at-home order
March 27	CARES Act (Coronavirus Aid, Relief, and. Economic Security Act)
May 21	Vaccine deal between the U.S. government and AstraZeneca
June 10	U.S. reaches 2 million cases
July 7	U.S. surpasses 3 million cases
July 27	Senate introduces HEALS Act (Health, Economic Assistance, Liability Protection and Schools Act)
August 11	U.S. government deal with Moderna: 100 million doses at $15/dose
September 1	U.S. rejects Covax proposition
September 16	U.S. releases Covid vaccination plan
November 3	Trump loses U.S. presidential election in part on Covid response
November 9	Vaccine companies start to announce successful results
December 15	U.S. begins with vaccinations
2021	
February 1	More Americans vaccinated than infected with Covid-19
March 19	100 million Covid-19 vaccine doses administered in the U.S.
July 8	67% of Americans vaccinated at least once.
July 9	Report of G20 panel, "A Global Deal for Our Pandemic Age"
August 1	70% of U.S adults received at least one dose of COVID-19 vaccine

Detection

People can be infected with the Covid-19 virus in various ways. The CDC states that one can catch the virus by inhalation, direct deposition, or touching. Therefore, it is important to detect it before it spreads from one person to another. The biggest pandemic before Covid, the H1N1 swine flu, which was declared in 2009, caused hundreds of thousands of deaths worldwide, but early detection played an important role in stopping it from spreading further (Dalal *et al*. 2020). The development of rapid influenza detection kits helped medical personnel detect the virus in less than 30 minutes. During Covid, how important was mass testing for the United States? How effective was the country in testing and tracing individuals?

China officially reported cases of pneumonia in Hubei province in late December 2019, though it is now thought that cases may have occurred as early as September. The first case in the United States was reported on January 21, eight days after the first recorded case outside of China. A month later, a total of 426 tests was administered nationwide (Dyer, 2020). This average of 14 tests a day was obviously insufficient to understand the spread of the virus. If people are not aware that they carry the virus, they will not take the precautions to protect other people. The United States was not able to trace cases, and early action in testing and tracing is fundamental to saving lives in pandemics. The low number of tests was probably due to regulations the CDC put in place for the testing kits. In fact, at first only CDC-produced kits were authorized in the market. Unfortunately, its first several thousand kits contained a design flaw (Dyer, 2020). The Food and Drug Administration (FDA) then allowed private testing kits, resulting in a great improvement in detection. In the beginning of March 2020, the United States administered approximately 8,500 tests,

about 15 times higher than the previous months' average (CDC, 2020). In May 2020, 99 percent of the tests were done by the private sector (Manabe *et al.*, 2020). Since August 2020, the U.S. has been performing more than a million tests per day.

This episode shows how government regulations may prevent the appropriate detection of a disease. The goal should not be to crowd out private firms, but to offer them incentives to produce more so that they minimize costs and lower prices. A more efficient way to make testing available would be to first make them more affordable. All the test kits that the CDC wasted represent a sunk cost added to the social cost of the lives that were lost. It would have been more productive for the U.S. government to have allowed the production of testing kits by anyone who could produce them to high-quality standards, and even to have encouraged their production through financial incentives.

The United States did a bad job at testing and tracing people with Covid-19. The CDC also neglected many ideas that seemed promising. Among them, I will focus on the Harvard Plan (Roadmap to pandemic resilience) and rapid home testing.

2.1. The roadmap to pandemic resilience (Harvard plan)

This plan, proposed by the Edmond Safra Center for Ethics at Harvard University, focused on speeding up testing to reopen closed businesses and activities as soon as possible. It favored massive testing and social isolation. The project had August of 2020 as a target for full reopening. Its hypothesis was that social distancing measures alone would cause future lockdowns, which are detrimental to the economy. In fact, prolonged lockdowns would certainly cause even higher unemployment rates than what the economy experienced. Its goal was to get 5 million tests per

day in the United States and eventually to increase the number to 20 million per day by July 2020. These numbers were minimums, because the goal was to understand the movement of the virus to fully remobilize the economy. The actual peak of testing, in July 2020, was around 900,000 tests per day. We are still under a million tests per day nearly a year later. In other words, we were and sill are far from large-scale testing, which is essential in tracing a pandemic.

Another aspect of the Safra Center plan was a Pandemic Testing Board to assure the supply of testing kits. Having a formal board for the supply of a good seems to be too complex for an urgent problem such as Covid-19. The U.S. government clearly failed in the supply of testing kits, but it was not for lack of a testing board. Therefore, a testing board does not seem necessary to trace Covid-19. As mentioned, CDC regulations and the lack of incentives for firms slowed population-scale testing.

2.2. Rapid home testing

Not knowing what you don't know can be hazardous. In the case of Covid-19, scientists discovered that people could carry and transmit the virus without having any symptoms. This asymptomatic aspect makes detection even more important. It is also not always convenient for people to leave their jobs or obligations to make appointments at testing centers. Rapid home testing could have been useful, especially early in the spread of the virus. Companies such as E25bio and 3M proposed rapid tests to provide results in under 15 minutes (Bailey, 2020). Their tests were like store-bought pregnancy tests. The problem was that the process to approve the prototypes was lengthy. The FDA only authorized the products in July 2020, by which time the U.S. already had millions of Covid cases. In the future it is desirable to have a way to speed up approval procedures in times of national emergency. One estimate is that rapid

home tests for all Americans would cost around $20 billion (Bailey, 2020). This type of population-scale testing would not only cost less but would help us get a sense of the trajectory of the virus.

2.3. Detection in Hong Kong, Taiwan, and South Korea

Hong Kong, Taiwan, and South Korea all had success with early Covid-19 detection. The United States is in a different continent than the early center of Covid-19, so if we want to learn something about the detection of the virus, it is useful to look at what countries close to China did to mitigate the risks. The common theme was that all adopted population-scale testing. In Hong Kong, testing supply was not an issue, and free testing centers were available to the population in the first days of the outbreak (BBC, 2020). Hong Kong managed to maintain the rate of infections at about 1 percent. Taiwan was also well prepared to fight the outbreak because it had learned from the SARS outbreak of 2004. Its National Health Command Center, which is responsible for action in this type of crisis, quickly introduced mass testing. I will discuss institutional preparedness later, but it is worth mentioning now once again that the United States was not ready because of federal negligence.

South Korean researchers argue that the country was effective in detecting Covid because it learned from a previous disease: Middle East Respiratory Syndrome (MERS), whose first outbreak occurred in 2012. South Korea's experience should be of particular interest to the United States because the key to its detection response was collaboration between the government and the private sector. South Korea made sure that the supply of tests was not an issue and built high-capacity screening and testing centers. Just a week after the first Covid case in the country,

the Korean Disease Control and Prevention Agency asked the private sector to produce diagnostic tests. Thousands of test kits were circulating in the country a few weeks later. In addition, the country had around 600 screening and testing centers plus 150 diagnostic laboratories as of November 2020 (June-Ho *et al.*, 2021). South Korea achieved rapid cooperation between the private and public sectors more effectively than the United States did.

Two levels of testing exist when there is a pandemic. The first level occurs when there is an urgent need to prevent the spread of the virus. It is still possible to get the virus under control and trace individuals. If the first-level response fails, there is still an opportunity to limit damage. In fact, even if the disease is already widespread and no cure exists, testing can help slow the rate of infection. When more people get tested, they will know to avoid public places so that they do not infect others. The first level of testing requires minimal effort. Only a few thousand tests are necessary to track down the initial carriers of the virus. If the virus spreads widely, far wider testing is desirable. In a country like the United States, millions of tests per day would be required, as seen in the Harvard plan. The United States failed at both levels of testing, and this can partially explain why it experienced such high rates of infection. As predicted by the Safra Center project, the United States dealt with widespread infections by imposing extended lockdowns, which are detrimental to economic activity.

Prevention

The detection of a virus during a pandemic is necessary but not sufficient to gain control over its spread. Health officials also must find ways to prevent transmission from one agent to another. One can contract Covid-19 by touching or inhalation, so preventing transmission implies a series of

behavioral changes. The CDC and many of its counterparts in other countries recommended that people adopt frequent handwashing, social distancing, cleaning of hard surfaces and wearing a mask. Travel bans were also one response many countries adopted, but we cannot really gauge their effectiveness since by the time they were imposed, the virus had already spread in various parts of the world. Handwashing and cleaning hard surfaces were relatively easy to adopt since they were already routine for many people. Also, their cost is small because they only require the purchase of fairly inexpensive goods by consumers in the private market. The United States and some other countries experienced shortages of cleaning supplies and protective equipment at the start of the pandemic; the next section discusses the role of the government in making these resources available.

The failure of early detection in the United States led to decisions that had strong negative effects on the economy. First, many businesses had to shut down due to social distancing measures and only essential workers were allowed to remain. The CDC defines essential workers as "those who conduct a range of operations and services in industries that are essential to ensure the continuity of critical functions in the United States." Everyone else was either working remotely or became unemployed. The unemployment rate reached a peak of 14.8 percent in April of 2020. Although social distancing is a good way to "flatten the curve" of transmission, officials took too long to use unconventional fiscal measures to reduce the effects of lockdowns on the economy. An unusual situation like the coronavirus pandemic calls for openness to unconventional policies. The federal government and state governments could have been more flexible with a lot of businesses since the start of the pandemic. This lack of flexibility affected the

production, distribution and consumption of goods and services during the pandemic.

Many small restaurants went out of business because of the risk that dining in represented for their customers. Despite their eligibility for loans, grants, and other supports, many also had to lay off workers because of increasing costs. Some restaurants had the possibility of shifting to another business model based on packaging and selling unopened food, like grocery stores. However, those that wanted to do so at the start of the pandemic found that it was illegal because of FDA regulations that prevented restaurants from labeling food for retail sale (Loria, 2020). By March 2020, the FDA eased the regulations to allow restaurants to sell their unopened food like grocery stores. This is an example of a reaction to take account of changing circumstances, but by the time it came into effect, many restaurants had already shut down. The authorization to allow more flexibility for businesses should occur early to facilitate the transition and reduce the costs. This is again an opportunity to emphasize the importance of procedures that would ease restrictions hampering business flexibility during pandemics.

A preventive measure that China took was building disinfecting stations for pedestrians and industrial workers. These stations are tunnels that detect and disinfect a person in as little as 20 seconds (Reuters, 2020). Having disinfecting stations along with adequate testing infrastructures would allow more workers, both "essential" and less essential to stay on the job. As mentioned above, when the virus is already widespread, large-scale testing can prevent transmission in social settings. Disinfecting stations, if effective, could also be used in schools, particularly in elementary and secondary schools, where many children do not understand the responsibility of wearing a mask. Enabling children to attend school safely reduces the burden on parents having to help students adapt to remote learning.

Many people with critical medical conditions died because they were not separated from Covid-19 patients. Healthcare workers were overwhelmed due to the high number of Covid cases. Doctors often had to make decisions to save some patients and let others die because resources were so scarce. Because of the coronavirus, hospitals received more patients than usual in intensive care units (ICUs), who brought a risk of contamination for non-Covid patients. According to Lisa Rosenbaum, a doctor at Brigham and Women's Hospital in Boston, cancer patients have been disproportionately affected by Covid. Some of them require frequent visits for maintenance therapy, which were interrupted because of Covid protocols (Rosenbaum, 2020). Therefore, it is important to find ways to isolate these patients to protect them. Contact with Covid patients is inevitable for most healthcare workers but oncologists or other special medical personnel could possibly be protected from direct exposure to the virus. Interruptions in the treatment of certain patients may have long-term impacts on their health. If possible, even a nationwide lockdown should not affect the treatment of this vulnerable population. The initial response of the U.S. healthcare system to this issue was in retrospect not satisfactory. As Dr. Rosenbaum stresses, doctors had to make the difficult decision of whom to save first. The way to avoid this dilemma was to have special units for Covid cases only. It was not feasible in the beginning of the pandemic due to a shortage of protective equipment, hospital beds and medical personnel. This shows the importance of preparedness and is in my view, the main lesson to learn for future pandemics. South Korea managed not to make the same mistakes twice after what its healthcare system learned from MERS. By collaborating with the private sector, it produced adequate quantities of protective equipment, masks, and other essential goods.

The CDC bears substantial responsibility for the failure to detect and prevent the spread of Covid-19 in the United States. However, the roots of this failure are not directly located in the institution itself. The FDA only started easing regulations several months after the start of the outbreak. In the meantime, unemployment roughly quadrupled, and thousands of people died. The problem is not only the CDC acting as a monopoly but the lack of speed and built-in institutional capacity in the responses. In the future, for example, the procedure for easing packaging regulations during lockdowns should be fast and effective rather than a complex system costing billions of dollars to the food industry.

In 2018 the White House reorganized its pandemic response team, merging it with another group. It was an unfortunate move considering the importance of pandemic preparedness. The team was formed after the government received criticism for its response to the Ebola outbreak that began in 2013 (Caldera, 2020). Despite this fairly recent experience, the United States was not well prepared for a pandemic. Perhaps we underestimated the benefits of preparation relative to the costs incurred by such a widespread disease.

Production and distribution (domestic and international)

The main economic principle highlighted in this section is scarcity. Knowledge and certain basic resources have been scarce during our experience with the coronavirus. This section focuses on the scarcity of the resources essential to containing Covid.

Despite the confusion that arose at the start of the pandemic, scientists around the world proposed ideas to address the virus. The last section discussed the "guidelines"

suggested by the CDC. For the public to adopt the behavioral changes, it was necessary to have certain health-related goods and services available and affordable. When Covid started to seriously hit the United States, demand spiked for some of those goods and shortages became chronic; supply almost never met demand for months. There was not enough hand sanitizer, protective equipment, and masks for both the population at large and for medical personnel. The U.S. Department of Health and Human Services maintained a Strategic National Stockpile (SNS), a reserve of drugs and medical supplies that the federal government can distribute to the states in the occurrence of public health crises. The stockpile was not adequate at the start of the pandemic for many reasons. First, it has an history of being underfunded (Gerstein, 2020). The lack of funding results in inadequate supplies for a rapid response by the federal government. Another problem was the weakness of the supply chains of the SNS. The stockpile did not have the right amount of resources to distribute to all the states at the start of the pandemic. Most states experienced shortages of N-95 masks, hand sanitizer and personal protective equipment (PPE). Indeed, the experience with Covid-19 showed that the stockpile needs stronger and less complex supply chains. The process of identifying the needs of each state should be fast and effective. The lags in deployment of supplies to the state and local governments also contributed to the failure of distribution of essential health-related goods. One way to deal with this issue would be to have an independent body regularly focusing on the status of the stockpile and publishing annual reports. Just as there is a regular indicator that measures the country's output (gross domestic product), reports on the stockpile could be viewed as an approximation of our preparedness. I specified that the body should be independent to try to reduce the political influence as much as possible. For

example, states should not receive supplies according to their affiliation with the federal government but based on their actual needs.

The Strategic National Stockpile is a great resource for pandemics or natural disasters. It can respond immediately even if the crisis was not expected. However, solely relying on a reserve of finished products would be a mistake. We will probably never be able to predict the exact amount of goods we need for each pandemic. The right approach is to keep the stockpile at a level appropriate for an initial response for a disease of the magnitude of Covid. We can see the stockpile as a complement to the active production of goods during public health crises. The scarcity of resources at the start of the pandemic was not only due to the flaws in the stockpile. It also had to do with slow national production that took some months to keep up with demand.

Thinking about national production does not imply that it is the responsibility of the government to monopolize either production or purchasing in a pandemic. Section 1 mentioned how CDC regulations created a shortage of testing kits in the United States. Rather, government should cooperate with the private sector to facilitate nationwide production. The most critical tool that the U.S. government possess in unusual times like Covid is the Defense Production Act. The goal of this legislation is to incentivize businesses to accept government contracts and prioritize the production of scarce materials (Mcintyre, 2020). President Trump did apply the Defense Production Act when the pandemic started but did not fully utilize it. When he signed it on May 18, 2020, he claimed that it was "just in case we need it" (Farley, 2020). Perhaps the administration underestimated the magnitude of the virus. By the time the Defense Production Act came into effect, daily cases and deaths were already ramping up. Thus, as the economist Richard McIntyre (2020) has observed, President Trump

failed to act like a wartime president. Underestimating the pandemic slowed the reaction of the United States to the "attack" of the virus. Trump also hesitated to invoke the act because he saw it as the nationalization of U.S businesses. Others are skeptical about the invocation of the Defense Production Act because there exist simpler ways to incentivize businesses. Vouchers and subsidies can signal the market to increase supply. The purpose of the Defense Production Act is to enforce cooperation between the state and the private sector to ensure an adequate supply of scarce resources. For future pandemics, authorities should be fully aware of both the potential advantages and disadvantages of applying the act.

Proper maintenance of the Strategic National Stockpile and correct application of the Defense Production Act can both help the United States to deal with the economic problem of scarcity. Policy makers should also consider revising regulations that slowed down production of key goods during Covid-19. For example, when the country experienced the initial shortage of hand sanitizer and disinfecting wipes, companies that produce alcoholic beverages wanted to produce some of these goods. Even though they had the technology, many state and federal regulations prevented them from entering an untraditional market. As I noted, an unusual circumstance like the coronavirus calls for unconventional policies. Government should be pre-disposed to loosen certain regulations to boost production when the country needs it. Even though the Food and Drug Administration eventually lifted one of the major regulations impeding beverage makers, the policy lag caused the shortage to persist. (Wiand *et al.*, 2020).

Now let us talk about the most fundamental production that had to happen during Covid. Hand sanitizer, masks and personal protective equipment are all good preventive materials against the coronavirus. However, there would be

no hope for a return to normal without an effective vaccine. Since the virus was new, there was no stockpiled supply of Covid-19 vaccines. Rather, the objective was to find a vaccine as soon as possible. As much the U.S. federal government deserves criticism for its slow reaction to the pandemic, it was effective in spurring production of a vaccine in a short period. A big reason was that Operation Warp Speed funded multiple vaccine companies rather than putting all funding behind a single government or private effort that might have failed.

Thanks to rapid development and production of vaccines, vaccination began in late 2020. There were distribution hurdles from the federal government to the states. The supply of doses to the state and local governments was complex because it involves multiple bureaucratic steps (Farley, 2020). Indeed, an effective way to boost the distribution of vaccines would be to make the transition as simple as possible.

The Biden administration had a vaccination rate goal of 70 percent before July 4, 2021. As of July 8, approximately 67 percent of Americans had at least one dose of the vaccine (Bebinger & Farmer, 2021). Even though vaccine suppliers are producing fewer doses than they were paid for, the issue is apparently on the demand side. Many people are still hesitating about taking the vaccine because they are skeptical about its effectiveness or concerned about side effects. Some states have offered incentives to citizens to try to increase the vaccination rate. They range from dinner with a state governor to a $1.5 million prize. There has not been a lot of research on the effectiveness of these incentives, but a group of economists found that Ohio's Vax-a Million campaign increased vaccination by 50,000-80,000 people in just two weeks (Brehm *et al.*, 2021). The campaign is a lottery system with weekly drawings promising a vaccinated winner a prize of up to $1 million (National Governors

Association, 2021). Thus, offering incentives to citizens can increase the uptake for vaccines.

Last, it is important to talk about the international distribution of the vaccine. If some countries do a great job at vaccinating the population and the rest of the world does not follow, the pandemic will not stop until most people have been infected, and more people have died. Therefore, international cooperation is very important. Donating doses to poor countries is a good idea as long as it involves minimum waste. For example, Malawi and South Sudan received doses that they could not store because they did not have the essential equipment. Wasted doses not only represents a sunk cost for both parties but decrease the likelihood of controlling the virus quickly at the global level. The ideal approach for future pandemics would be to fund research that can find simpler ways to store vaccines, or vaccines that are easy to store. In addition, countries with surplus of doses willing to donate should shift their attention to the areas where the virus represents a bigger problem. Some of the doses that went to waste in Africa could have been used for countries such as Brazil and Peru with higher cases per capita. The limitations of this approach are the domestic politics of the countries concerned. If a government or the nation does not believe in the effectiveness of a vaccine, distributing it to them will generate even higher costs. In July 2021, the Group of 20 (G20) countries met to discuss funding for pandemic preparedness. A report prepared for their meeting observed that international cooperation should be enforced for future pandemics and many gaps needs to be filled in terms of global pandemic preparedness (G20, 2021).

Research and publicity

The detection and prevention of a virus may not succeed for various reasons. I already discussed the tardiness of the response of the United States and the lack of cooperation between the government and the private sector. An additional barrier to containing the virus is the circulation of information: people must be properly informed about the necessary precautions.

The United States confirmed its first case a month after the first reported case in China (Dyer, 2020). How effective was the CDC in informing the population about the danger of Covid-19? Did the population receive clear instructions from both federal and state authorities? As seen in Section 2, the first guidelines the CDC issued stressed frequent handwashing and social distancing. There was also a series of campaigns attempting to provide accurate information about the disease. Slogans such as "six feet apart" or "quarantine," related to CDC guidelines, became more popular at the start of the pandemic (Dingtao *et al.*, 2020). The CDC succeeded in providing some guidance to the population. Unfortunately, much misinformation circulated about the virus. We cannot say if it circulated more than the correct information, but the population did not know how dangerous Covid could get. Many people were opposed to the CDC guidelines and did not believe in the disease (McGreal, 2020). President Trump himself frequently claimed that the virus was under control, and it would disappear within a few months. Attitudes towards the disease became politicized in the United States and to a lesser extent in some other countries.

Each crisis represents an opportunity for the government to be better prepared for the next one. South Koreans understood that rapid testing and tracing is the key to controlling the virus in its early phase after their experience

with MERS. The country already had a system put in place to increase the production of testing kits and protective equipment (June-Ho *et al.* 2021). The United States also had experience with similar diseases but still failed to convince the population about the threat of Covid-19. As Bourne (2021) notes in his book *Economics in One Virus,* the United States has been persistently weak in pandemic preparedness. For example, in a 2014 report, the Department of Homeland Security questioned the country's readiness for a pandemic because they found many flaws in the stockpile (Bourne, 2021, chapter 10).

We knew a pandemic could come anytime but we were still not prepared, so the problem was not the availability of information. Therefore, there must be other explanations for the lack of publicity for Covid-19. One is that 2020 was presidential election year and candidates were in full campaign mode. Then-president Donald Trump initially saw Covid-19 as a tool for his opponents to criticize his administration. Indeed, he often urged his followers not to take the virus seriously (McGreal, 2020). He was not alone in either major political party. Politics detracted from what was important: controlling the virus, as soon as possible. Partisanship also occurred in several media outlets, which were contradicting one another, and this was not ideal for the education of the population on the virus.

Bourne (2021) also mentions something that can explain the lack of publicity for Covid-19 at the start of the pandemic. He believes that the United States was not prepared because of political incentives. Politicians are often rewarded for their response to a crisis, but the public is rarely interested in their preparedness (Bourne, 2021). Thus, there were no real incentives to educate the population about the possible effects of Covid-19 when the United States was not yet hit by the virus. In future pandemics, we must be aware of the political challenges because they represent a

significant barrier to an adequate reaction. The response strategy must be independent from any political agenda. There must be competent and credible public health experts guiding the reaction. In addition, the population was confused throughout the pandemic. While states issued stay-at-home orders, the political climate at the time led citizens to protest. There were no ways to safely exercise this constitutional right because protesters were not able to practice social distancing. I do not imply that people should not have protested during Covid. Rather, authorities should be clear on the message they transmit to the population. The initial guidelines discourage people from attending any large gatherings. Suddenly, after the death of George Floyd on May 25, 2020, many public health officials reversed their guidance and endorsed attendance at large public protests demanding social justice. There was no uniformity in the message for the population, which hurt the credibility of public health experts. Perhaps mass testing and disinfecting stations would allow stay-at-home orders to be less restrictive.

Given the dispersed nature of knowledge, we did not know how to deal with Covid-19 before it hit the country. Most of the knowledge we have now was generated by markets. We might witness something like Covid-19 in the future, but we might also be afflicted by a completely different disease. The best approach is to assume that at least some of them will be like it. There has been considerable research about medical and behavioral responses to Covid-19. The findings help identify what worked and what did not during the pandemic. Therefore, new research on Covid-19 offers us a range of possibilities for future pandemics, from testing to public health guidelines. The most important scientific outcome of the pandemic is the Covid vaccines developed by several firms. Relying only on the preventive measures and the production of key materials would not be

sufficient considering how the virus had already spread. The alternative would be to let herd immunity develop naturally, but doing so would probably cause what almost everyone would consider too many deaths. To repeat, it was a good decision by the U.S. government to fund multiple companies through Operation Warp Speed without knowing which vaccine would be the most effective. Some other countries also funded their own researchers or drug makers, giving the world even more choices. The cost of funding extensive vaccine research is low compared to the benefit of saving lives with effective vaccines. If one or some turned out to be ineffective, it would be outweighed by the benefits of protecting the world population with just one working vaccine.

There are currently three companies producing vaccines for the U.S. with different levels of efficacy. Most vaccines require at least two doses for the patient to be safe against Covid. As of August 9, 2021, though, only about 50.8 percent of the U.S. population is fully vaccinated against the virus (Our World in Data, 2021). To speed up vaccination, one possibility is fractional dosing, the injection of just a fraction of the full dose to the patient. Tabarrok *et al.*, (2021) argue that fractional dosing could significantly increase the global vaccine supply. Their hypothesis rests on the fact that a fraction of the dose of some Covid vaccines is more effective than a full dose of another. For example, a full dose of a highly effective vaccine could be divided into two or three, which would double or triple its supply. One limitation is that firms are not incentivized enough to pursue trials on this possibility because they could potentially lose money (Tabarrok, 2021). Fractional dosing seems well worth trying as a way to increase the vaccine supply, particularly in countries behind in vaccination campaigns.

Research on Covid has many positive externalities for treatment of other diseases. The technology used to develop

Covid vaccines gave scientists a starting point to treat previously incurable conditions. For example, the company Moderna is currently working on vaccines against HIV and Zika thanks to the development of their Covid-19 vaccine. This research will also help in the fight against different types of tumors (Bailey 2021). In addition, BionTech is using technology involved in the Covid-19 vaccine to find treatment for breast and ovarian cancer (Bailey 2021). These developments suggest that the knowledge spillovers make the investment in Covid research even more cost-effective than it looked at the start of the pandemic.

Costs and conclusions

The U.S. government has so far spent $5.32 trillion in its response to Covid-19. Of that amount, though, $690 billion was on the health sector, and of that, only a modest amount was for vaccines. The government has also provided $510 billion in liquidity support.

Fiscal spending by the rest of the world combined is estimated at $4.61 trillion (IMF, 2021). Thus, the United States has spent more than the rest of the world combined to respond to Covid. Only a small portion of fiscal spending in the United States and elsewhere was allocated to the health sector, which seems to be a case of underfunding. Lockdowns saved lives but also imposed high costs in terms of lost national income. Looking at the increasing unemployment rate during Covid and the decrease in consumption, we see that extended lockdowns had substantial opportunity costs. Thus, lockdowns should be temporary rather than prolonged and uncertain.

The benefits of adequate preparation clearly seem to outweigh the costs, even just looking at the United States alone. Suppose that a fraction of the more than $5 trillion spent on responding to Covid had been devoted to

pandemic preparedness. To illustrate, let's say there are ten factories, scattered across the country, that can mass-produce protective equipment, masks, and other essential materials. They are idle unless there is an urgent need like a pandemic or natural disaster. If the average cost of maintaining these mothballed factories is $500 million each, the total cost of keeping them in reserve would be $5 billion per year. At that rate it would take 200 years for the factories to cost the government $1 trillion, i.e., 17 percent of the total spending on Covid in just a year. Thus, the United States and many other countries should revise their estimates of the benefits of preparation to avoid even higher costs. We cannot affirm that Covid-19 would be totally under control if we had such facilities at the start, but at least we would have had a head start. The focus should not be on what we could have done but what we currently know and how can we use it for the future. To repeat, pandemics are not always predictable, but preparation is key.

Summary of lessons

The U.S. response to Covid lacked flexibility. Institutions and regulations often frustrated rather than facilitated appropriate responses.

Countries that did better than the U.S. in the beginning were more effective at using knowledge from previous diseases.

The public health message to the population about Covid-19 was inconsistent. Inconsistency in turn created confusion and chaos.

Funding for research on vaccine storage was low. If countries do not have the proper equipment to store doses, there will be a lot of vaccine wastage.

There was a clear lack of collaboration between the private sector and the federal government; the monopolization of several markets by the government created shortages of certain essential goods.

Many existing regulations halted the production, distribution, and consumption of key items in the fight against Covid.

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Pandemic Economy:
Covid-19 effects and consequences in the first year

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